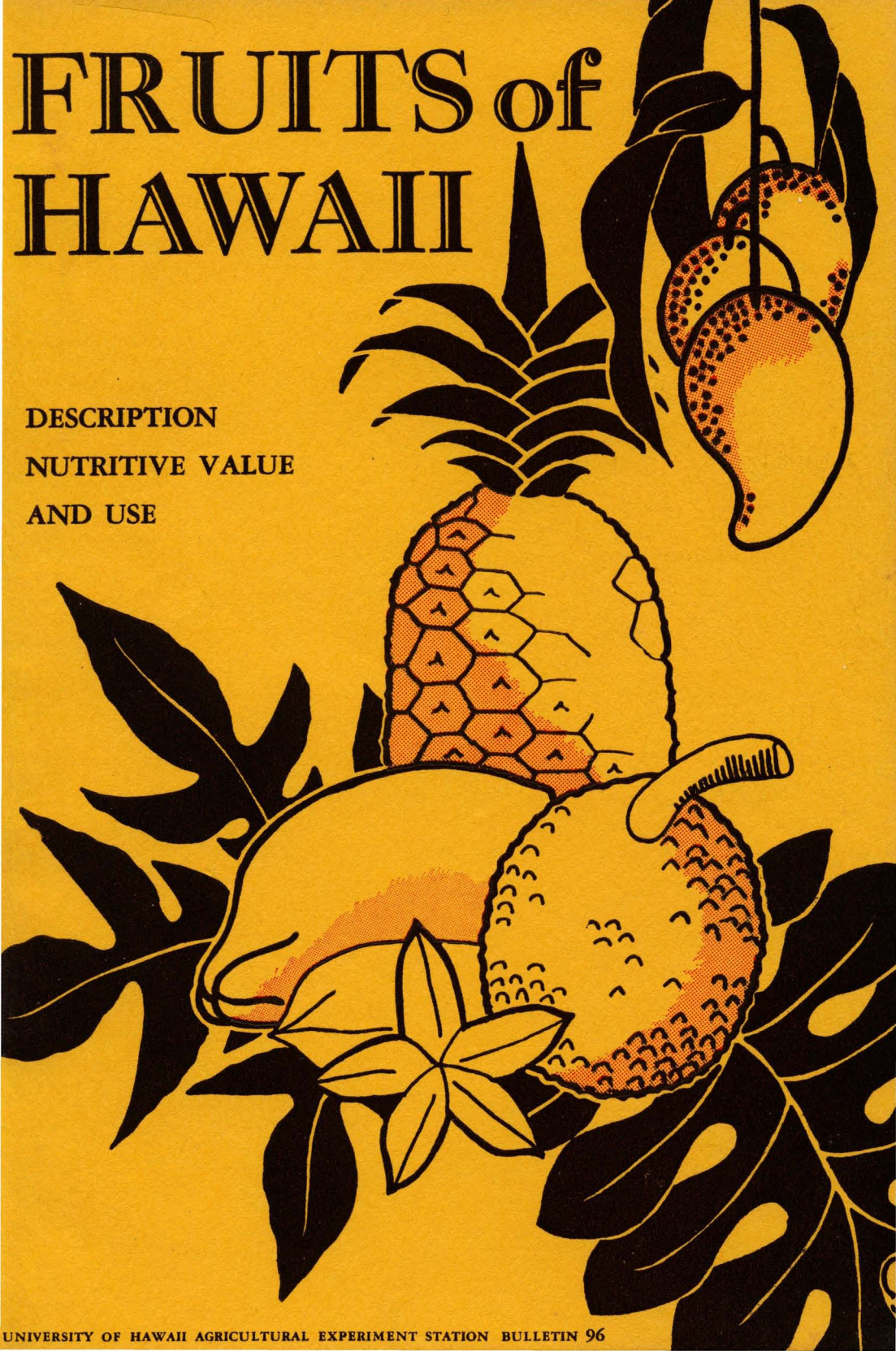
FRUITS of HAWAII

DESCRIPTION
NUTRITIVE VALUE
AND USE



UNIVERSITY OF HAWAII AGRICULTURAL EXPERIMENT STATION BULLETIN 96

FRUITS of HAWAII

Description, Nutritive Value, and Use

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UNIVERSITY OF HAWAII AGRICULTURAL EXPERIMENT STATION BULLETIN 96
HONOLULU, HAWAII OCTOBER, 1945

Some Fruits of Hawaii (Bulletin 77)
First Printing, 1936
Second Printing, 1937
Third Printing, 1939

Fruits of Hawaii (Revised Edition of Bulletin 77)
First Printing, 1945

PUBLISHED BY THE UNIVERSITY OF HAWAII. PRINTED BY THE HONOLULU STAR-BULLETIN, LTD., HONOLULU, HAWAII, U.S.A.

FOREWORD

This popular edition of Fruits of Hawaii is published in response to a demand for information on how to utilize the fruits available in Hawaii. It is a revised and enlarged edition of Hawaii Agricultural Experiment Station Bulletin 77, Some Fruits of Hawaii, first published in 1936, which is now out of print. Information and recipes have been added for five new fruits—carissa, ketambilla, mulberry, Java plum, and roselle. Included also are other additional recipes, and general directions for canning and preserving of fruits. Recent data obtained in the nutrition department on the vitamin content of fruits described in this bulletin and the criteria for evaluating the fruits as sources of minerals and vitamins* are given in the appendixes. Throughout this bulletin "supply" relates to the Hawaiian Islands and sometimes more especially to the Honolulu market.

Technical data on the chemical constituents of the fruits and methods used for their determination, and references to the literature appearing in Hawaii Agricultural Experiment Station Bulletin 77 have been omitted from this popular edition. Scientific data obtained in the Experiment Station laboratories or published elsewhere are available to support statements relating to nutritive value.

Most of the recipes of Fruits of Hawaii have been contributed by Katherine Bazore, who collected them from various sources and devised new ones. The remainder of the recipes have been contributed by the senior author and by others. Under Miss Bazore's direction, recipes were tested and revised by students in the Home Economics Department of the University of Hawaii.

ACKNOWLEDGMENTS. Many people contributed to the preparation of Some Fruits of Hawaii, Hawaii Agricultural Experiment Station Bulletin 77, and consequently have contributed to this one. Ruth C. Robbins, the junior author of Bulletin 77, has not been associated with the University of Hawaii Agricultural Experiment Station since 1937. Some historical, descriptive, and chemical data in Bulletin 77 were taken from a thesis submitted by Miss Robbins in partial fulfillment of the requirements for the degree of Master

* Throughout this bulletin chemical terms for two of the important vitamins are used—thiamine for B_1 and ascorbic acid for vitamin C.

of Science in Nutrition at the University of Hawaii, 1934. Staff members of the Office of Experiment Stations and the Bureau of Home Economics, United States Department of Agriculture, Washington, D. C.; staff members and students of the Home Economics Department, University of Hawaii; staff members of the Hawaii Agricultural Extension Division; staff members of the Hawaii Agricultural Experiment Station; and others outside the University have all rendered valuable assistance. Especial acknowledgment is again made to Dr. Willis T. Pope, former horticulturist at the Hawaii Agricultural Experiment Station, for information concerning the history, descriptions, varieties, and seasons of many of the fruits, and for the photographs for some of the illustrations. Other photographs were made by M. Miyamoto and R. J. Baker.

The authors are indebted to Dr. William Storey, associate horticulturist, who has checked the data on description and history of the black mulberry, ketambilla, carissa, roselle, and Java plum.

CAREY D. MILLER

Honolulu, Hawaii
January, 1945

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Carolyn Shepherd Burr designed the cover.

AVOCADO

DESCRIPTION. There are three races of avocados *(Persea americana)*, two of which, the West Indian and Guatemalan, are common in Hawaii. The following key used by horticulturists shows the main differences between the three races:

(*a*) West Indian race. Summer and fall ripening; fruit large; rind leathery and not more than 1/16 inch in thickness.

(*b*) Guatemalan race. Winter and spring maturing; fruit large; rind 1/16 to 1/4 inch in thickness, woody in texture.

(*c*) Mexican race. Leaves small and anise-scented; fruit small and thin-skinned.

The fruit is pear-shaped, round, or obovoid and sometimes weighs more than 3 pounds. The brilliant green skin, which changes in some varieties to red, purple, or purplish-black as the fruit matures, varies from smooth to warty in texture. The yellow or light green flesh which surrounds the single large seed is smooth in texture and of a characteristic nutty flavor. In the best varieties there is very little fiber imbedded in the flesh.

HISTORY. All races of the avocado are natives of tropical America, where they have been under cultivation for many centuries. Don Marin, the Spanish horticulturist who introduced many valuable plants into Hawaii, is credited with having started the first avocado trees in the Islands sometime before 1825. As the fruit was of poor quality, the avocado did not become popular until better varieties were grown. In 1895 Rear Admiral Beardslee brought to Hawaii three Guatemalan seedlings from which many of the present varieties have been developed. In 1919 the Hawaii Agricultural Experiment Station received through the Office of Foreign Seed and Plant Introduction of the United States Department of Agriculture a part of a fine collection of Guatemalan avocados made by Wilson Popenoe in the highlands of Guatemala.

The word "avocado" is derived from the Spanish *ahuacate* or *aguacate*, which in turn was derived from the Aztec word *ahuacatl*. Many other spellings, such as albecata, arragato, avocato, have been used by various historians. The form "avocado" was first used in 1669 by Sir Henry Sloane, who spoke of the "avocado or alligator-pear." Both of these names have persisted and are common in English-speaking countries today. As the term "alligator pear" seems objectionable, efforts are now being made to replace it by the more euphonious "avocado."

More detailed information regarding the avocado may be obtained from The Guatemalan Avocado in Hawaii, Hawaii Agricultural Experiment Station Bulletin 51.

NUTRITIVE VALUE. With the exception of olives, no other fruit contains so large a percentage of fat as do avocados. The fat content of avocados varies widely from 7 to 26 percent according to variety and race. The figures for

water content show an equally wide variation. The caloric value of any one sample of avocados, though always great in comparison with that of other fruits, will vary according to the fat and water content, one-fourth to one-half of a medium avocado yielding 100 calories.

By means of human digestion experiments done elsewhere, the digestibility of the oils in fresh avocados was first found to be 93.7 percent, a value comparable to that for butter; but later experiments gave a value of 82.5 percent.

The calcium content of avocados analyzed in Hawaii is only about one-fourth that reported by other investigators for avocados grown elsewhere. The phosphorus content is greater than that of many common fruits, and the iron content is relatively high.

Avocados are a poor source of vitamin A, a fair source of thiamine, and a fair to poor source of ascorbic acid. Biological tests indicate that summer avocados have less vitamin A and thiamine than the winter avocados, but additional work must be done to determine if this holds true for all varieties at the two seasons. The ascorbic acid content varies with the variety, the highest value, 15 milligrams per 100 grams, and the lowest, 5 milligrams per 100 grams, have been found in two summer varieties.

SUPPLY. Some variety of avocados is on the market in Hawaii from the middle of June until the following March. Few or none are available in April and May. They are most abundant in late summer and early autumn when the supply is likely to exceed the demand. The hard-shell "winter" avocado is placed on the market during November, December, and January. The price and quality of the fruit vary greatly.

USE. The avocado is a favorite salad fruit. The most common ways of serving it are "on the half shell" and in salads and fruit cocktails. Because of the high fat content of many varieties, the avocado combines best with vinegar or with such acid fruits and vegetables as pineapple, oranges, grapefruit, lemons, and tomatoes. However, some Orientals prefer sugar on it instead of an acid substance. Avocado with guava catsup is a pleasing combination. Combined with catsup, lemon juice, vinegar, or onion, the avocado makes a delicious sandwich spread. The avocado contains a tannin which causes it to develop a very bitter flavor if cooked; consequently no successful method of canning it has been found. It may, however, be satisfactorily used in such hot foods as vegetable soup, consomme, or omelette if diced and added just before serving.

AVOCADO COCKTAIL

YIELD: 6 servings

4½ cups diced avocado
1 cup tomato catsup
1 teaspoon finely chopped onion
½ teaspoon salt
1½ tablespoons lemon or 1 tablespoon lime juice
½ teaspoon Worcestershire sauce

Sprinkle salt over the avocado and chill. Combine other ingredients, chill, and pour over avocado just before serving.

AVOCADO-PAPAYA COCKTAIL

YIELD: 6 servings

3 cups diced avocado
1 ½ cups diced ripe papaya
½ cup tomato catsup
3 tablespoons cream or undiluted evaporated milk

Add cream or milk to catsup when ready to serve and pour over chilled diced fruit.

AVOCADO-GRAPEFRUIT COCKTAIL

YIELD: 6 servings

2 ½ cups avocado cubes
¼ teaspoon salt
2 cups grapefruit pieces

Cut avocado into half-inch cubes and sprinkle with salt. Remove membrane from grapefruit sections and cut them into pieces about the same size as those of avocado. Add to avocado, chill, and serve in cocktail glasses with or without cocktail sauce.

AVOCADO-PINEAPPLE SALAD

YIELD: 6 servings

6 slices fresh pineapple
2 cups avocado slices
⅓ cup mashed avocado pulp
⅔ cup mayonnaise
2 tablespoons lemon or 1 ½ tablespoons lime juice

Place pineapple and avocado slices on lettuce leaves. Make a dressing of the other ingredients, chill, and pour over salad.

AVOCADO-FRUIT SALAD

YIELD: 6 servings

1 ½ cups grapefruit sections
1 ½ cups orange sections
¾ cup ripe mango slices
1 cup avocado slices

Remove membrane from orange and grapefruit sections. Chill all ingredients, arrange on lettuce leaves, and serve with French dressing or mayonnaise.

OTHER SALAD COMBINATIONS

Avocado may be served with sliced tomato. Combined with shredded or finely chopped carrot, cabbage, celery, cucumber, and onion, it may be added to coleslaw or to a mixed vegetable or gelatin salad. If one prefers sweet rather than acid combinations, avocado may be combined with apple or banana. Chicken, crab, lobster, shrimp, and tuna fish salad may be served in peeled avocado halves.

AVOCADO-GRAPEFRUIT SALAD DRESSING

YIELD: 6 servings

½ cup mashed avocado pulp
½ teaspoon salt
½ cup grapefruit juice or ⅓ cup lime juice

Press avocado through a coarse sieve if the pulp is fibrous. Add other ingredients and mix until a smooth paste is obtained. Chill and serve over lettuce.

AVOCADO SANDWICH FILLING

YIELD: ½ cup

½ cup mashed avocado pulp
¼ teaspoon salt
½ teaspoon grated onion
Dash of pepper
¼ teaspoon Worcestershire sauce (if desired)
⅔ teaspoon lemon or ½ teaspoon lime juice

Combine all ingredients and blend thoroughly.

Variation: This mixture may also be served with potato chips as an appetizer. If desired, the bowl may be rubbed with a cut piece of garlic before mixing or serving the avocado mixture.

CURRIED AVOCADO

YIELD: 6 servings

4 tablespoons butter
5 tablespoons flour
2 cups milk
1 ½ teaspoons salt
2 to 3 teaspoons curry powder
2 cups diced avocado

Melt butter, add flour, and stir to make a smooth paste; stir in milk gradually, cooking until the mixture thickens. Season with curry powder, salt, and pepper. Remove from heat, and just before serving add avocado. Serve with cooked rice and mango chutney.

AVOCADO WITH CREAMED FISH*

YIELD: 4 servings

2 tablespoons fat
2 tablespoons flour
1 cup milk
½ to ¾ cup canned salmon or tuna (or other cooked fish)
½ teaspoon salt
2 medium avocados

Melt fat, add flour, and blend. Add milk slowly, stirring until thick and smooth. Add fish, salt, and additional seasoning if desired. Cut avocados in half lengthwise and remove seeds. Fill each half with the creamed fish and heat in a moderate oven (350° F.) about 10 minutes, or place under broiler for few minutes to brown on top. The avocado should not be cooked but should be warmed.

Variation: Slices of avocado may be placed on crisp toast and covered with creamed fish.

AVOCADO MILK SHERBET

YIELD: 1 ¼ quarts

1 cup mashed avocado pulp
⅛ teaspoon salt
1 ¼ cups sugar
½ cup pineapple juice
½ cup orange juice
⅓ cup lime or ½ cup lemon juice
1 cup milk

* MILLER, CAREY D., and LIND, HELEN YONGE. FOOD FOR HEALTH IN HAWAII. Hawaii Agr. Expt. Sta. Bul. 88, p. 75. 1942.

Press avocado pulp through a sieve. Add salt, sugar, and fruit juice, and stir until sugar is dissolved. Add milk gradually and pour into refrigerator freezing pan. Freeze quickly until partially frozen. Stir every half hour until mixture is frozen.

A superior product may be obtained by freezing in an ice-cream freezer using 8 parts of ice and 1 part of ice-cream salt.

BANANA

DESCRIPTION. The banana *(Musa sapientum),* which is now one of the best known fruits throughout the world, was classed as a luxury and known to comparatively few people in the United States until late in the nineteenth century. Because it is so well known, a detailed description of the fruit seems unnecessary. The yellow cylindrical fruit, with the tough outer peel that acts as a prophylactic cover for the enclosed pulp, is a common sight in most parts of the world. Bananas grow in a bunch consisting of a number of clusters called hands, each of which contains from 5 to 20 bananas.

HISTORY. The early history of the banana is closely interwoven with Eastern mythology. The legend that the serpent which tempted Eve in the garden of Eden (Paradise) hid in a bunch of bananas influenced the classifiers to name the fruit *Musa paradisiaca* (fruit of paradise) and *Musa sapientum* (fruit of knowledge). The fact that the fruit was called apple of paradise or Adam's fig before the word "banana" was adopted from an African Congo tribe also illustrates its connections with ancient mythology. The word "banana" seems to have been used originally for only those varieties which were eaten raw and the term "plantain" for those which were eaten only after cooking. At present there is no clear differentiation.

When the early Polynesians migrated to Hawaii from the islands to the south, they undoubtedly brought with them banana plants in the form of bulblike rhizomes and planted them in the mountain valleys, where they now grow wild. Until the introduction during the nineteenth century of varieties such as the Brazilian, Chinese or Cavendish, and the Apple, the fruit of these plants brought by the Polynesians was the only kind to be had in Hawaii. The Gros Michel variety (locally called Bluefields) was not introduced into Hawaii until 1903. Most of the Hawaiian bananas (those varieties growing in the islands when they were discovered by Captain Cook in 1778) are more palatable after being cooked. Favorites among the Hawaiian varieties are the *Maiamaoli,* the *Popoulu,* and the *Iholena*—which represent the three groups of Hawaiian bananas.

More detailed information regarding the banana may be obtained from Banana Culture in Hawaii, Hawaii Agricultural Experiment Station Bulletin 55.

NUTRITIVE VALUE. Because bananas are an economical and nutritious food and are plentiful and available everywhere in Hawaii, greater use should be made of them.

In the half-ripe stage, one half to one third of the total carbohydrate may be in the form of starch. But when fully ripe and, in the case of many varieties, if the yellow skin is flecked with brown spots or is entirely brown, almost no starch remains and practically all the carbohydrate is in the form of sugars.

Unripe bananas may cause digestive disturbances, but in the fully ripe stage they are readily digested and have been used successfully combined with milk in infant feeding. There is no reason why bananas, if they are cooked or if they are used only in the fully ripe stage, cannot be used generously in children's diets. Like most fruits and vegetables, bananas yield an alkaline ash in the body.

Bananas are a poor source of calcium and a good to poor source of phosphorus. Cooking bananas are a better source of iron than the varieties of bananas that are usually eaten in the raw state.

The two bananas most widely grown and generally available in Hawaii (Bluefield and Chinese [Cavendish] varieties) are only fair sources of vitamin A and contain negligible amounts of thiamine. (We have found the quantity of thiamine present too small to determine by animal feeding experiments.) Likewise these two bananas were found to be poor sources of ascorbic acid.

One variety of cooking bananas *(Maiamaoli)* was found to be a good source of vitamin A, a poor source of thiamine, and a fair source of ascorbic acid.

SUPPLY. Bananas are to be found on the market in Hawaii at any time during the year, the supply usually exceeding the demand, though certain varieties are not always available. It is often difficult to obtain good Chinese bananas, because most of those grown here are exported.

USE. The banana is one of the few fruits which may be picked full sized but green and which may be stored for a considerable length of time without injury to its flavor. Because cold prevents proper ripening, bananas should not be placed in a refrigerator until after fully ripened. When the fruit is ripe and ready for use, the banana skin is often flecked with brown spots or may be almost entirely brown. Fully ripe bananas are superior in flavor to half-ripe ones.

Bananas may be divided into two general classes—the cooking banana, more palatable after cooking, and the eating banana, which is usually used raw but may be cooked. Cooked ripe or green bananas may be served as a starchy vegetable, taking the place of white or sweetpotatoes. In the uncooked state, they are a favorite breakfast or dessert fruit and may be used in fruit cocktails, salads, pies, cake fillings, and ice creams.

BANANA MILK SHAKE YIELD: 1 serving

1 very ripe eating banana
1 cup fresh or diluted evaporated milk
¼ teaspoon vanilla
⅛ teaspoon salt

Choose a banana with skin flecked with brown spots or skin entirely brown. Peel and press through a coarse sieve. Add other ingredients gradually, stirring with a fork until well mixed. Chill thoroughly, shake in a fruit jar, and serve in a tall glass. For variety, add 3 tablespoons guava juice and 1 tablespoon sugar.

If electric food liquifier or mixer is used, banana need not be mashed.

BANANA-GUAVA NECTAR

YIELD: 6 servings, ¾ cup each

4 medium-sized ripe bananas
1 cup canned guava juice
1 cup water
⅔ cup sugar or 6 tablespoons sugar and ¼ cup honey

Peel banana, slice, and force through a coarse sieve. Combine with other ingredients, pour over cracked ice and serve.

If electric food liquifier or mixer is used, banana need not be mashed.

SAUTED BANANAS

YIELD: 6 servings

4 large ripe cooking bananas
2 tablespoons butter
2 tablespoons sugar
2 tablespoons lemon or 1 ½ tablespoons lime juice
2 tablespoons orange juice

Peel and cut bananas into halves lengthwise. Melt fat in frying pan and brown bananas in it. Add sugar and fruit juice, and simmer until bananas are soft. Serve hot as a vegetable.

BOILED BANANAS

YIELD: 6 servings

6 large ripe cooking bananas
3 cups boiling water

Leave the bananas in their skins. Wash, then boil for 20 minutes in water. Drain and serve in the skin as a vegetable, or peel and season with butter and salt.

BAKED BANANAS IN THE SKINS

YIELD: 6 servings

6 large ripe cooking bananas

Leave the bananas in their skins. Wash and place in baking pan without water or with only enough water to cover the bottom of the pan. Bake at 350° F. for 30 to 45 minutes, or until soft and skins begin to burst. Serve in skins and season with butter, salt, and pepper at the table.

BANANAS BAKED IN FRUIT JUICE

YIELD: 6 servings

6 cooking bananas
½ cup orange sections
⅓ cup sugar
2 tablespoons orange juice
2 tablespoons lemon juice

Peel bananas, cut lengthwise, and place in baking dish. Remove membrane from sections of oranges. Arrange slices of oranges on top of bananas. Sift sugar over bananas and oranges and add fruit juice. Bake at 300° to 350° F. for 45 minutes. Serve hot or cold.

GUABANAS

YIELD: 6 servings

4 tablespoons sugar
1 ⅓ cups guava juice
6 medium or 4 large fully ripe bananas

Mix sugar and guava juice. Cut thin slices of bananas into juice. Chill. Serve with or without grated coconut.

BANANAS WITH COCONUT SAUCE

YIELD: 6 servings

5 bananas
⅔ cup fresh grated coconut
1 cup milk
2 tablespoons sugar

Place whole, unpeeled bananas in boiling water and cook until soft (20 to 30 minutes). Drain off water, remove skins, and cut bananas lengthwise. Make sauce by heating grated coconut in milk combined with sugar, and pour over bananas. Serve as a dessert, with whipped cream if desired.

Variation: For a thickened sauce, mix 1½ teaspoons cornstarch with sugar, moisten with ¼ cup cold milk, and combine with remaining milk and coconut. Place over low heat and stir until thick.

BANANA SANDWICH

Slice a peeled, ripe banana lengthwise. Place on buttered sandwich bread. Spread with mayonnaise and sprinkle with salt. Cover with a lettuce leaf and a slice of bread.

BANANA AND PEANUT BUTTER SPREAD

YIELD: 1 ¼ cups

½ cup peanut butter
¼ cup hot water or evaporated milk
¾ cup mashed ripe banana
2 to 3 tablespoons lemon or lime juice

Cream peanut butter, add hot water or evaporated milk, and blend thoroughly. Add banana pulp and season with lemon juice.

BANANA BUTTER SPREAD

YIELD: 1 ½ cups

1 cup ripe banana pulp
2 tablespoons butter
1 cup sugar
4 tablespoons lemon juice
1 egg

Peel and press bananas through a sieve. Add butter, sugar, lemon juice, and egg. Cook over hot water until thick as custard, or for about 5 minutes. Use for sandwich or cake filling. This recipe makes sufficient filling for a two-layer cake.

BANANA WALDORF SALAD

YIELD: 6 servings

1 ½ cups diced ripe bananas
1 ½ cups diced apple
1 cup diced celery
⅓ cup chopped nuts
¾ cup cooked salad dressing or mayonnaise

Have ingredients chilled before dicing. Combine with nuts and mayonnaise and serve on lettuce leaves garnished with pimiento strips or guava jelly. If allowed to stand, salad will darken in color; therefore serve it immediately.

BANANA AND NUT SALAD

YIELD: 6 servings

3 large or 6 small ripe bananas
¼ cup lemon juice
⅓ cup chopped nuts
¾ cup mayonnaise

Peel and cut bananas in halves lengthwise. Roll them in lemon juice, then in nuts, and place on lettuce leaves. Pour mayonnaise over them and serve.

BANANA ICEBOX CAKE

YIELD: 6 servings

1 ¼ cups evaporated milk or whipping cream
1 tablespoon gelatin
⅓ cup cold water
1 ¼ cups mashed ripe bananas
¼ teaspoon salt
3 tablespoons lemon juice
6 tablespoons sugar
2 dozen ladyfingers

Pour evaporated milk into refrigerator freezing tray and allow to remain until small crystals appear around sides of the tray. Pour into chilled bowl and whip with rotary egg beater until mixture is stiff. If whipping cream is used, chill thoroughly before whipping.

Soak gelatin in cold water for 5 minutes, melt by placing over boiling water, and combine with mashed banana, salt, lemon juice, and sugar. Cool and, when mixture begins to thicken, fold in whipped evaporated milk or whipped cream. Line pan with ladyfingers and cover with a layer of the banana-cream mixture. Alternate layers of ladyfingers with banana-cream mixture. Chill thoroughly before serving. Serve with whipped cream and garnish with guava jelly.

Variation: Pieces of sponge cake cut ½ inch thick may be used in place of ladyfingers.

BANANA-COCONUT CUSTARD

YIELD: 6 servings

2 eggs
2 cups milk
4 tablespoons sugar
¼ teaspoon vanilla
1/16 teaspoon salt
¾ cup fresh grated coconut
1 cup sliced very ripe bananas

Beat eggs slightly. Add other ingredients. Pour into a baking dish and bake in slow oven (300° to 325° F.) for 1 hour.

BANANA WHIP*

YIELD: 4 servings

2 egg whites
½ cup sugar
1 ⅓ cups mashed banana (4 bananas)
3 tablespoons lemon juice

Beat egg whites until stiff. Add sugar slowly and continue beating. Fold in mashed banana and lemon juice. Chill. The egg yolks may be used in a soft custard and served as a sauce over the whip.

BANANA CREAM PIE

YIELD: 4 to 6 servings

3 tablespoons cornstarch
½ cup sugar
¼ teaspoon salt
1 ½ cups milk
1 tablespoon butter
2 egg yolks
½ teaspoon vanilla
1 cup sliced bananas
2 egg whites
2 tablespoons sugar

Prepare pastry as directed in recipe for Plain Pastry. (See below.)

Mix cornstarch, sugar, and salt. Add 3 tablespoons of the milk and mix to a smooth paste. Heat remaining milk and slowly pour in the cornstarch paste, stirring constantly. Cook over hot water 20 minutes, add butter, cool slightly, and add egg yolks slowly to the mixture, stirring rapidly. Cook several minutes until it thickens. Remove from heat, cool, and add vanilla. Arrange slices of banana in baked pie shell, pour in custard mixture, and cover top with meringue made of stiffly beaten egg whites and 2 tablespoons sugar. Brown in a slow oven (300° to 325° F.) for about 20 minutes.

PLAIN PASTRY

YIELD: 1 two-crust pie

2 cups sifted flour
½ teaspoon salt
⅔ cup fat
⅓ cup cold water

METHOD I

Sift salt and flour into bowl. Cut in the shortening with fork, two knives, or pastry blender until shortening is evenly mixed in pieces no larger than small peas. Add water and stir with a fork until dough gathers on fork in a ball

* MILLER, CAREY D., and LIND, HELEN YONGE. FOOD FOR HEALTH IN HAWAII. Hawaii Agr. Expt. Sta. Bul. 88, p. 78. 1942.

leaving sides of bowl clean. Dough may be chilled before rolling out or used immediately.

METHOD II

Sift flour and salt into bowl. Take out 1/3 cup of this flour and mix with 1/4 cup of water to form a paste. Add fat to remaining flour; cut fat in with knives, fork, or blender until the pieces are the size of small peas. Next, add flour-paste to fat-flour mixture. Mix thoroughly until the dough comes together and can be shaped into a ball. Divide dough in half and roll out two crusts separately about 1/8 inch thick.

BANANA LOAF CAKE*

YIELD: 2 small loaves

1 cup enriched flour
3/4 cup rice middlings
2 teaspoons baking powder
1/4 teaspoon soda
1/2 teaspoon salt
1/3 cup fat
2/3 cup sugar
2 eggs, well beaten
1 cup mashed bananas (2 or 3 bananas)

Sift together flour, rice middlings, baking powder, soda, and salt. Cream fat, add sugar gradually, and continue creaming until light and fluffy. Add eggs and beat well. Add flour mixture alternately with mashed bananas, a small amount at a time, beating after each addition until smooth. Pour into one large or two small well-greased loaf pans and bake in a moderate oven (350° F.) about 1 hour.

Variation: Whole-wheat flour may be substituted for all or part of the rice middlings.

BANANA MOUSSE

YIELD: 6 to 8 servings

3/4 cup evaporated milk or 1 cup whipping cream and 1/4 cup thin cream
1/2 tablespoon gelatin
2 tablespoons water
1/2 cup sugar
1/2 cup boiling water
2/3 cup mashed ripe banana
Speck of salt
1/4 cup lemon or 1/3 cup lime juice
3 tablespoons orange or sweetened guava juice

Pour evaporated milk in refrigerator freezing pan and chill until crystals begin to form around edges of the pan. Pour chilled milk into chilled bowl and whip with rotary egg beater until stiff. If whipping cream is used, chill thoroughly before whipping.

Pour cold water over gelatin and press out lumps. Combine sugar and boiling water, bring to boiling point, and add gelatin. Stir until dissolved, cool, and pour over banana. Season with salt and fruit juice. Add thin cream if

* MILLER, CAREY D., and LIND, HELEN YONGE. FOOD FOR HEALTH IN HAWAII. Hawaii Agr. Expt. Sta. Bul. 88, p. 81. 1942.

whipping cream has been used. Pour into freezing tray and chill until mixture begins to set. Fold in whipped cream or evaporated milk and allow to freeze. Stir mixture once during freezing period.

THREE-FRUIT ICE YIELD: 1 ¾ quarts

⅓ cup lemon juice
1 cup orange juice
2 cups sugar
2 cups water
1 cup mashed ripe banana pulp

Combine the fruit juice, sugar, and water. Press banana pulp through a coarse sieve and add the liquid ingredients. Freeze the mixture in an ice-cream freezer, using 8 parts of ice to 1 part of ice-cream salt.

BREADFRUIT

DESCRIPTION. The seedless variety of breadfruit *(Artocarpus communis)** commonly found in Hawaii and known as the Hawaiian breadfruit is a large round or oblong fruit 4 to 8 inches in diameter. The skin, which is green in the unripe stage, acquires a greenish-brown or yellow tint as the fruit matures. The firm, mealy, slightly fibrous pulp surrounds a tough central core. In most varieties the flesh is light creamy-yellow and has a slightly sweet odor.

HISTORY. Breadfruit trees were brought to Hawaii from Tahiti before the coming of the white man. G. P. Wilder states in The Fruits of the Hawaiian Islands that the first suckers were brought by Hawaiians who landed at Ewa and carried them across the mountains to one of the chiefs of Oahu. In Hawaii the breadfruit has never been as important an article of the diet as in Tahiti and other south Pacific islands. Most ancient sites of civilization, especially those around Kona and Hilo, show large areas of cultivated breadfruit trees, and the trees now grow wild in hot, moist sections of all the Islands. The Hawaiian name *ulu* corresponds to the Tahitian name *uru.*

NUTRITIVE VALUE. Breadfruit has about the same quantity of total carbohydrate (starch and sugar) as have sweetpotatoes and taro, and more than white potatoes. Like bananas, breadfruit when fully ripe gives no test with iodine, indicating that all the starch has been changed to sugars.

The Hawaiians never ate their breadfruit in the unripe or starchy state as did the Tahitians and Samoans. They preferred it at least half ripe or ripe. The Polynesians used breadfruit as a supplement to or as a substitute for taro and sweetpotatoes, and there seems to be no reason why it should not be so used today.

The calcium content of breadfruit is higher than that of white potatoes and about the same as that of sweetpotatoes and taro. These vegetables all have

* See fig. 2, p. 64.

about the same quantity of phosphorus, but taro, sweetpotatoes, and white potatoes are superior sources of iron.

Breadfruit is a poor source of vitamin A and a fair source of thiamine. It is a good source of ascorbic acid when raw but as breadfruit is eaten only after cooking, the fact that it is a fair source in the cooked state is of greater practical interest.

SUPPLY. Breadfruit may be purchased in the market at intervals from July to February and occasionally at other times during the year. Although breadfruit seems to be plentiful, the quantity reaching the market does not exceed the demand.

USE. Breadfruit may be picked in the *tepau* stage, when the milky sap comes to the surface but the fruit is still firm, green, and starchy. If a riper and therefore sweeter stage is desired, it may be picked when the skin is yellow-green or just beginning to turn brown. It is always cooked before it is eaten. If boiled in the *tepau* stage, it is an excellent food resembling the potato in flavor. If it is to be used ripe, the fruit should be kept until it becomes soft and the outside skin partially brown in color. The ancient Hawaiians cooked the whole breadfruit in the underground oven or *imu.* Today it is usually baked or steamed. After cooking, it may be made into *poi* and used as a substitute for taro *poi,* or may be combined with it. However, breadfruit *poi* is not as commonly used by the Hawaiians as by other Polynesians.

BAKED RIPE BREADFRUIT

Choose a ripe breadfruit which is soft, with the small sections of the skin flattened and partially brown in color. Wash, and place whole breadfruit in a pan containing just enough water to keep pan from burning. Bake in a moderate oven (350° F.) for 1 hour. Remove from oven, pull out core and stem, cut breadfruit in half, and season with butter, salt, and pepper, or butter and sugar. If preferred, remove the core and stem before baking, place 1 tablespoon butter and 1 tablespoon sugar in the cavity, and replace stem during baking period.

STEAMED BREADFRUIT

Remove stem, core, and the skin also if desired, from a soft ripe breadfruit. Cut breadfruit into halves or quarters, place on a pan, and steam in a covered steamer for 1 to 2 hours, or until thoroughly cooked. Season with butter, salt, and pepper.

FRIED BREADFRUIT

Slice steamed breadfruit into pieces ½ to ¾ inch thick and fry in hot fat until they are a golden brown color. The breadfruit may be rolled in flour before frying.

BREADFRUIT POI*

YIELD: 6 servings

1 large ripe breadfruit
Water

Choose a breadfruit that is ripe but not soft. Cover the breadfruit with boiling water and boil until it is tender. Drain and cool the breadfruit. Remove the skin, core, and seeds, and cut the fruit into slices. Grind the slices in a meat grinder, place the pulp in a bowl, and pound it with a wooden potato masher until a smooth paste is formed. Knead the poi with the hands, adding water gradually until the desired consistency of a thin paste is obtained. Strain the poi through a poi cloth and serve it immediately or place it in the refrigerator to ripen for two days.

If the poi is not kept in the refrigerator, only a small amount of water should be added while kneading it. Then the poi should be placed in a bowl and covered. It may be mixed with water and strained just before using.

Breadfruit poi is frequently combined with an equal quantity of taro poi.

BREADFRUIT CHOWDER

YIELD: 6 servings

2 thin strips of bacon
⅓ cup sliced onion
½ cup diced raw carrots
2 cups diced raw green breadfruit
2 teaspoons salt
3 cups boiling water
1 ⅓ cups milk

Cut bacon into small pieces and fry until light brown. Add onion and cook until a light brown color. Add vegetables, salt, and water. Boil until vegetables are tender. Add the milk and serve hot.

BOILED GREEN BREADFRUIT

YIELD: 6 servings

4 cups diced green breadfruit
3 cups boiling water
3 tablespoons butter
¾ teaspoon salt
Pepper to taste

Choose a breadfruit which is still quite firm and green in color. Peel and dice it. Add water and cook about 1 hour or until tender. Uncover and evaporate excess water, season with butter, salt, and pepper, or with salt and sugar. Serve as a starchy vegetable.

BREADFRUIT AND COCONUT PUDDING—Papaiee

YIELD: 6 servings

1 ½ cups coconut milk extracted from 1 grated coconut with 1 cup boiling water
3 cups ripe breadfruit pulp
½ cup sugar
½ teaspoon salt

Pour boiling water over grated coconut and allow to stand 15 minutes. Knead coconut with the hands and strain through two thicknesses of cheesecloth,

* BAZORE, KATHERINE. HAWAIIAN AND PACIFIC FOODS, p. 245. New York. 1940.

squeezing out as much milk as possible. Scrape out the pulp from soft ripe breadfruit and add coconut milk, salt, and sugar. Pour into an oiled baking dish and bake 1 hour or more in a moderate oven (350° F.).

CARAMBOLA

DESCRIPTION. The carambola *(Averrhoa carambola)** is a translucent yellow or yellow-green fruit 4 to 5 inches long and about 2 inches in diameter. It has five prominent ribs which make it distinctly star-shaped in cross section. The thin, waxy skin encloses a very juicy pulp and several smooth brown seeds. There seem to be two varieties, distinguished as the sweet carambola and the sour carambola. Both are quite mild in flavor.

HISTORY. Like many other fruits found in Hawaii, the carambola is believed to be a native of the Malayan archipelago and to have been taken from there to America at an early date. The history of its introduction into Hawaii is not known, but the tree may have been brought from southern China by the early Chinese immigrants or by sandalwood traders.

NUTRITIVE VALUE. The carambola juice contains about 10 percent of sugar. In comparison with other fruit juices it has a very small percentage of calcium and iron but contains about the same amount of phosphorus. Carambolas are a fair source of vitamin A, a poor source of thiamine, and a good source of ascorbic acid.

SUPPLY. The carambola is grown chiefly as an ornamental shrub and is rarely found in the markets. It ripens during November and December.

USE. The watery pulp of the fruit has a pleasant taste and is refreshing to eat when ripe or to use in an iced drink. An unpleasant bitter flavor develops when the fruit or juice is cooked or canned. Although the fruit contains a small quantity of pectin, it is not recommended for jelly making.

SWEET CARAMBOLADE

YIELD: 6 servings

2 cups sweet carambola juice
4 cups cold water

Wash carambolas and cut into small pieces. Press through sieve or squeeze in coarse cloth to obtain juice. Mix juice with water and pour over cracked ice.

SOUR CARAMBOLADE

YIELD: 6 servings

2 cups sour carambola juice
¾ cup sugar
4 cups cold water

Wash carambolas, cut into small pieces, and press through sieve or squeeze in coarse cloth. Add sugar and water to juice and pour over cracked ice.

* See fig. 3, p. 65.

SOUR CARAMBOLA SHERBET YIELD. 1 ½ quarts

1 teaspoon gelatin
1 tablespoon cold water
⅞ cup sugar
2 cups boiling water
1 ½ cups sour carambola juice
1 ⅓ tablespoons lemon juice

Soak gelatin in cold water. Add sugar to boiling water and boil for 5 minutes. Remove from heat and add gelatin, stirring until it is dissolved. Cool to lukewarm, add fruit juice, and freeze, using 8 parts of ice to 1 part ice-cream salt.

CARISSA

(Natal Plum)

DESCRIPTION. The fruits of the carissa *(Carissa grandiflora)** are elongated or round and vary in size and shape; a typical fruit is about an inch in diameter and an inch and a half long. The skin of the fully ripe fruit is bright crimson streaked with darker red; it is thin and bruises easily. The flesh is deep red, or crimson, with white mottling. In the center there are about 12 small brown flat seeds. The fresh fruit has a mild, slightly pungent flavor, is slightly granular in texture, and is somewhat astringent.

When bruised, broken, or cut, the fruit and branches exude a white latex that is harmless except that it may be irritating if it comes in contact with the eye. (Papaya latex also is extremely irritating to the eye.)

HISTORY. The carissa is often called the Natal plum because it is a native of the province of Natal, Africa. It was introduced into Hawaii in 1905 by the Hawaii Agricultural Experiment Station a year after the Bureau of Plant Industry obtained it from Africa. During the following years, many carissa plants were distributed throughout the Islands. The thorny shrub with dark green leaves, fragrant white blossoms, and bright red fruit is used especially for hedge planting.

NUTRITIVE VALUE. The carissa has relatively large quantities of sugar and sufficient acid and pectin to make a good jelly. It is a good source of ascorbic acid, a somewhat better source than the average orange. No analyses of the various minerals in carissa are available.

SUPPLY. The fruit are not sold on the Honolulu markets. The plant produces fruit the year round, usually yielding the best crop in the spring, but a rather large planting is necessary to obtain a quantity of fruit at one time.

USE. The carissa may be used fresh but it is most satisfactory when cooked. The cooked juice and pulp have an unpleasant milky-red appearance but become an attractive bright red when cooked with sugar. The jelly is an exquisite

* See fig. 4, p. 66.

red color with a delicate, characteristic flavor suggestive of raspberry. The sauce, made by straining or sieving the stewed fruit and cooking it with sugar, is preferred by some to cranberry jelly.

The white latex in the fruit forms a rubbery, sticky ring around the pan in which the carissa are cooked. To remove it, rub with a piece of dry paper towel or with a coarse bit of cloth soaked with salad oil. Do not use steel wool or an abrasive powder as it only makes the sticky substance more difficult to remove.

CARISSA JELLY

YIELD: 4 six-ounce glasses

4 cups crushed or sliced ripe carissa
2 cups water
Sugar (1 cup to each cup of strained juice or pulp)

Wash and drain fruit; slice, or crush if fruits are very soft. Add water, bring to boiling point and simmer 15 to 20 minutes, or until fruit is tender. Drain through jelly bag for a clear jelly, or put through sieve or fine colander for a jelly containing the pulp.

Measure juice or juicy pulp; use an equal amount of sugar. Bring juice to boiling point. Add sugar and boil until the mixture sheets from the spoon (see p. 126 for jelly test). Pour into sterilized jelly glasses and seal with paraffin.

Note: If tart jelly is desired, use ¾ cup sugar for each cup juice and pulp. Using some carissa that are not fully ripe also makes a more tart jelly.

SWEET PICKLED CARISSA

YIELD: 4 pints

4 pounds carissa (100 medium)
2 pounds (4¼ cups) granulated sugar
2 cups mild vinegar
1 cup water
6 3-inch pieces of stick cinnamon
1 tablespoon whole cloves
1 tablespoon whole allspice

Wash the carissa, remove stems, and blanch in boiling water 2 minutes. Remove skins, halve, and remove seeds with small spoon. In the meantime boil sugar, vinegar, water, and the spices (tied loosely in a piece of cheesecloth) for 5 minutes. Add carissa to the resulting sirup and boil 30 minutes or until they are tender. Allow carissa to stand in the sirup overnight. Next morning remove spice bag and bring carissa to the boiling point. Pack carissa in hot sterilized jars, add sufficient sirup to completely fill the jars, and seal.

JELLIED CARISSA SALAD

YIELD: 6 servings

1 tablespoon gelatin
¼ cup cold water
1 ¼ cups boiling carissa juice or juice and pulp
¼ cup sugar
¼ teaspoon salt
2 tablespoons lemon juice
1 ½ cups chopped celery

Soften gelatin in cold water for 5 minutes. Dissolve sugar, salt, and softened gelatin in boiling carissa juice. Cook and add lemon juice. When mixture begins to thicken, add chopped celery. Turn into mold and chill. When firm, unmold on bed of shredded lettuce and garnish with mayonnaise.

CARISSA CREAM YIELD: 6 servings

1 tablespoon gelatin
½ cup cold water
1 cup boiling carissa juice
½ cup sugar
1/16 teaspoon salt
1 cup heavy cream, whipped

Soften gelatin in cold water for 5 minutes, dissolve in boiling carissa juice, and add sugar and salt. Stir until sugar dissolves, then chill until slightly thickened. Fold in whipped cream, turn into mold, and chill until firm. Unmold and serve as a dessert.

COCONUT

DESCRIPTION. The coconut is the large, one-seeded fruit of the coco palm *(Cocos nucifera)*. The endosperm within the nut is the edible portion. A fibrous husk encloses the brown, hard-shelled nut, 4 or 5 inches in diameter. G. P. Wilder stated: "After being fertilized by the adjacent staminate flowers, the hollow interior of the shell becomes filled with sweet water. The spherical fruits gradually increase to from 4 to 8 inches in diameter. The endosperm, at first an opaque, jelly-like substance, forms in the inner walls of the shell, and gradually absorbs the water; it attains a firm thickness of from 0.25 to 0.5 inch. This is known as the coconut meat and forms an important article of diet for the Polynesian people." In the early stages the meat is soft and jelly-like and is known as spoon coconut because nowadays it usually is eaten with a spoon. Later the meat becomes crisp and firm. In this bulletin the watery liquid from within the coconut is called water and the expressed juice obtained from squeezing the grated coconut meat is called milk.

HISTORY. Most varieties of coconuts growing in Hawaii at the present time were introduced within the last century. Those growing in the Islands at the time of the arrival of the first missionaries were small and of inferior quality and are often called Hawaiian coconuts to distinguish them from later introductions. This original strain or variety was probably brought to Hawaii by the early Polynesians when they migrated from the islands to the south. The many varieties of coconuts have not been classified botanically. The Hawaiians and South Sea Islanders distinguish the varieties by differences in the color and texture of the husk, the thickness and flavor of the meat, and the amount of oil present. Although the Hawaiian Islands are near the northern limit for the growing of coconuts, many excellent varieties thrive, but they do not bear so abundantly here as farther south.

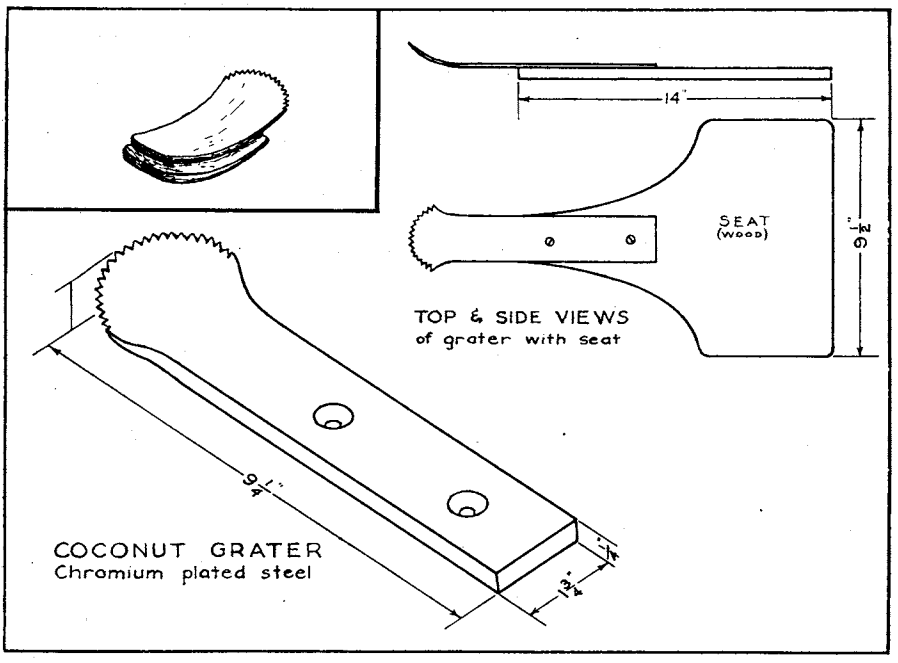


FIGURE 1.—Diagram of coconut grater. Insert shows grater made from coconut shell.

NUTRITIVE VALUE. The chemical composition of the edible portion of the coconut varies with the stage of development.

The water from immature coconuts has been shown to contain as much calcium as some fruits and vegetables, if not more. The phosphorus content is variable, and the iron content is negligible. Immature coconuts contain from 300 to 700 cubic centimeters of water.

Coconut water has an acid reaction. Samples of water from very young coconuts having little or no meat were tested in the station laboratory and found to have an average *p*H of 4.7. The water from within fresh young coconuts contains ascorbic acid in small amounts, but compared with fruits generally it is a very poor source of this vitamin.

The southern Polynesians and other peoples inhabiting tropical islands where coconuts grow make great use of coconut water, and early voyagers in the Pacific area relate that they drank the coconut water offered them by the natives.

The meat begins to form when the nut is about 6 months old, counting from the time when the spathe first opens. As the meat develops, its water content gradually decreases, the fat and total ash increase, and the protein and sugar content show less marked changes. The meat of mature coconuts contains a relatively large amount (5.4 percent, fresh basis) of crude fiber.

Analyses of expressed coconut milk show it to be high in fat (27 percent) and low in protein (4 percent), and it has been pointed out that neither coconut water nor coconut milk are comparable to cow's milk in organic nutrients or calcium and phosphorus content.

Coconut in any form contains little or no vitamin A. The white meat from fresh mature coconut is a fair source of thiamine but contains no ascorbic acid. The expressed coconut milk is a poor source of thiamine.

SUPPLY. Though the retail demand is small, coconuts are available all year round and may be purchased in all the larger markets and at many roadside stands.

USE. Coconuts are plentiful in the Hawaiian Islands, but they are not very generally used, doubtlessly because of the labor and time required to prepare them. Considerable time and effort may be saved by using a grater such as the Hawaiians and Samoans use. Figure 4 shows a grater made from a piece of steel about 9 inches long, 2 inches wide, and ¼ inch thick, having one end flattened and slightly curved upward with teeth a little less than ⅛ inch wide and ⅛ inch long. This metal piece may be nickel or chromium plated in order to prevent rusting. The total cost should be about two dollars. The metal grater may be screwed to a straight piece of wood or, better, to a wooden seat. The coconuts should be separated into halves, but when using this type of grater the meat should not be removed from the shell. To use the coconut grater, place it on a chair or stool, sit on the wooden seat in order to hold it firmly in place, hold a piece of coconut in both hands, and scrape the meat over the metal grater so that the grated coconut drops into a pan which has been placed underneath the grater.

Kenneth P. Emory of Bernice P. Bishop Museum, Honolulu, recommends making a grater from coconut shell as follows: "With a saw, cut a thick, rectangular section of coconut shell, 1¾ inches wide and about 3 inches long. The cutting edge should be curved, beveled on the under side, and toothed by a row of 10 to 15 notches, about ⅛ inch deep (fig. 1, p. 25). The notches are most readily made with a file but it is possible to cut the bevel and notches with a knife. The grater should be reinforced by a second rectangular section of shell placed under it." The completed grater should be screwed, or lashed with rope or heavy twine, to a board and may be used in the same manner as the metal grater.

For some uses the coconut may be prepared by putting the meat through a vegetable grater or meat grinder.

Coconuts are used in different stages of ripeness. Spoon coconuts may be chilled and served—the meat to be eaten with a spoon and the liquid drunk through a straw. Halves of young coconuts with adhering soft meat may be used as individual containers for fruit cocktail.

The milk extracted from the grated coconut meat may be used in place of cow's milk in curries, coconut puddings, and frozen desserts. The Hawaiians add the coconut milk to cooked chicken, fish, or taro leaves near the end of

the cooking process. Polynesians also combine the milk with bananas, breadfruit, sweetpotatoes, and taro in baked or steamed puddings. Fresh grated coconut may be used in candy, cake icings, and pies.

COCONUT MILK

YIELD: 3 cups

Choose a coconut which is not fully mature. Have the outer husk removed from the nut. Using a nail or ice pick, open the two soft eyes at the end of the nut. Drain the water from the inside. Crack the nut with a hammer and remove the meat. Grate the meat, or put it through a vegetable or meat grinder. If graters of the type described in the foregoing paragraphs are used, it is not necessary to remove the meat from the shell. When grated, a medium-sized coconut usually yields 3 cups. To obtain thick coconut milk to serve over puddings, taro leaves, fish, etc., add ¼ to ½ cup of coconut water or boiling water to the meat grated from the coconut. Allow it to stand 15 minutes, knead with the hands, and squeeze through poi cloth or two thicknesses of cheesecloth. If the milk is to be used in curry sauce for chicken, eggs, shrimps, or in cornstarch pudding, a larger quantity of water (1 to 2 cups of water to 3 cups of grated coconut) may be used. The coconut meat will still retain sufficient flavor after the milk is extracted to be used in candy or macaroons if desired.

COCONUT SIRUP*

YIELD: 1 ½ cups

1 ¼ cups coconut water
3 cups grated coconut (1 nut)
¼ teaspoon cream of tartar
1 ½ cups sugar

Prepare coconut water and grated coconut according to directions given in recipe for coconut milk. Pour coconut water over grated coconut. Work well with the hands to extract the juice. Strain mixture through a poi cloth or several thicknesses of cheesecloth. Squeeze out as much liquid as possible.

To 1 cup of this extracted coconut milk, add the sugar and cream of tartar. Stir until sugar is dissolved. Cook slowly without stirring until the temperature reaches 224° F. Then stir in ¼ cup more extracted coconut milk. Cook until the temperature again reaches 224° F. Stir in another ¼ cup coconut milk and cook to the same temperature. If more coconut milk is available, add another ¼ cup and cook to 224° F. again. By adding milk several times, the sirup is caramelized which gives it a light brown color and a more distinctly coconut flavor.

Remove sirup from the stove, pour into jars, and seal immediately. Sirup made for immediate use may be put in jars that are not sealed airtight if they are kept in the refrigerator.

* TRIMBLE, ALICE P. EMERGENCY USES OF COCONUT. Hawaii Univ. Agr. Ext. Home Econ. Cir. 137. 1942.

TOASTED COCONUT CHIPS

Pierce the eyes and drain liquid from the coconut. Heat coconut meat in oven for 1 hour at 300° F. Remove from oven, cool, then tap the surface with a hammer until the shell breaks in pieces. Remove coconut meat in large pieces. It is not necessary to remove the thin brown peeling. Slice very thin and spread on shallow baking pan. Place in oven at 200° F. for 2 hours. Then reduce the heat as low as possible to keep coconut from becoming too brown. Heat at lower temperature for another 2 hours or longer, stirring several times. Remove from oven, cool, and store in airtight jars in a cool place. Use in place of nuts in cookies, cakes, and candies.

COCONUT PUDDING—Haupia

YIELD: 6 to 8 servings

6 cups grated fresh coconut (2 coconuts)
2 cups boiling water
} to yield 3 cups extracted coconut milk

For soft pudding—
3 tablespoons cornstarch

For stiff pudding—
6 tablespoons cornstarch

3½ tablespoons sugar

Pour boiling water over grated coconut and allow to stand 15 minutes. Strain through double thickness of cheesecloth or poi cloth, squeezing out as much of the milk as possible. If this does not yield 3 cups, add water poured from the inside of the coconut to make that amount. Mix cornstarch with sugar and add sufficient coconut milk to make a smooth paste. Heat remaining milk to the boiling point, slowly stir in cornstarch paste, and boil until it thickens. Pour into mold and allow to cool. Stiff pudding may be cut into 2-inch cubes and served on squares of *ti* leaves in the Hawaiian style.

HAOLE HAUPIA

YIELD: 6 servings

1 coconut grated (3 cups)
1 cup boiling water and coconut liquid
3 tablespoons cornstarch
3 tablespoons sugar
⅔ cup cow's milk
⅔ cup fresh grated coconut
⅓ teaspoon vanilla

Drain liquid from inside the coconut and add sufficient boiling water to make 1 cup. Grate coconut meat, add the cup of water and coconut liquid, and let stand 15 minutes. Knead mixture with the hands, then squeeze liquid through poi cloth or several thicknesses of cheesecloth. Squeeze out as much milk as possible; 1½ cups of coconut milk should be obtained. Mix sugar, cornstarch, and ¼ cup coconut milk to make a smooth paste. Combine remaining coconut milk and cow's milk. Heat to boiling and stir in the cornstarch paste. Boil until mixture thickens, stirring constantly. Cool, add ⅔ cup fresh grated coconut and vanilla. Pour into a square layer cake pan and cool. Cut into 2-inch cubes and serve.

PAPAYA-COCONUT PUDDING

YIELD: 2⅔ cups, 8 servings

3 cups shredded coconut (1 coconut)
1 cup boiling water
} to yield 1½ cups coconut milk

1⅓ cups thick papaya pulp
⅔ teaspoon salt
¾ cup sugar
7 tablespoons cornstarch

Pierce the eyes of the coconut and drain the liquid from the inside. Save this liquid. Grate the coconut meat or grind it in a meat grinder. Pour boiling water over the coconut and allow it to remain 15 to 30 minutes. Knead coconut with the hands, strain the liquid through a poi cloth or several thicknesses of cheesecloth, squeezing out as much liquid as possible. If this does not yield 1½ cups, add some of the liquid from the inside of the nut.

Press the papaya pulp through a sieve and then measure it. Mix the cornstarch, sugar, and salt together, and stir into the papaya. Cook over a low heat, stirring the mixture constantly until it thickens. Add the coconut milk and cook 5 to 10 minutes or until the mixture is thick enough to be served with a tablespoon and hold its shape when cool. It should not be stiff enough to mold. Pour the mixture into a deep dish or pan and chill. Thick coconut milk (see recipe, p. 27) may be served over the pudding if desired.

COCONUT CONFECTION

YIELD: 1 pound

4 cups fresh grated coconut
⅞ cup sugar
¼ cup corn sirup
2 egg whites

Place grated coconut with corn sirup and sugar in the top of a double boiler. Stir while cooking until mixture clings to spoon. Add egg whites and cook until the mixture feels sticky when tried between the fingers. Spread in a wet pan, cover with wet paper and cool. Then chill by placing in the refrigerator. Dip hands into cold water, then shape mixture into balls. Using about 1½ tablespoons for each, make 40 to 50 balls. Warm a baking sheet and rub lightly with paraffin or oil. Place the balls on the sheet, flatten slightly, and bake in a slow oven (300° to 325° F.) 30 to 40 minutes.

COCONUT CANDY I

YIELD: 1½ pounds

3 cups sugar
1 cup water
3 cups fresh grated coconut

Combine the water and sugar. Heat the mixture slowly, stirring until the sugar is dissolved, then boil until it spins a thread (235° F.). With a fork wrapped in a damp cloth, remove the crystals from the side of the pan, or cover the pan for 2 or 3 minutes until the crystals are dissolved.

Remove the sirup from the heat, stir in the coconut, place over the heat and boil slowly 10 minutes (224° F.). Remove from the heat and stir the mixture

vigorously until it becomes creamy and is of the proper consistency to drop from a teaspoon on waxed paper.

This candy is soft immediately after making, but it hardens slightly on standing.

COCONUT CANDY II

YIELD: 1 ½ pounds

3 cups fresh grated coconut
3 cups sugar
1/16 teaspoon salt
½ cup milk
¾ teaspoon vanilla

Thoroughly mix coconut, sugar, salt, and milk. Place over a low heat, bring to a boil, and cook about 5 minutes or until the mixture appears glassy around the edge of the pan. Stir frequently. Remove from the heat and beat 5 minutes until partially cool. Add vanilla and drop from a teaspoon on waxed paper. This candy should be used the day it is prepared, for it becomes sugary after standing.

WAIKIKI COCONUT CREAM PIE

YIELD: 4 to 6 servings

½ cup sugar
3 tablespoons cornstarch
1/16 teaspoon salt
2 cups milk
3 egg yolks
½ teaspoon vanilla
½ cup whipping cream
¾ cup fresh grated coconut

Combine the sugar, cornstarch, and salt. Scald the milk and slowly add to it the dry ingredients. Stir until a smooth mixture is obtained. Cook over hot water, stirring frequently. Cool the mixture to lukewarm and stir in the egg yolks. Cook over hot water until the custard thickens. Cool, add vanilla, and pour into a baked pie shell. (See Plain Pastry recipe, p. 16.) Chill, then whip the cream. Just before serving, spread the custard with the whipped cream and sprinkle with coconut.

COCONUT CREAM PIE

YIELD: 4 to 6 servings

⅔ tablespoon gelatin
3 tablespoons cold water
1 ⅓ cups scalded milk
2 eggs
¼ cup sugar
1/16 teaspoon salt
½ teaspoon vanilla
¾ cup fresh grated coconut

Soak gelatin in the cold water. Add sugar and salt to egg yolks, and slowly add the milk. Cook this mixture over hot water, stirring until the custard mixture thickens and coats the spoon. Do not allow the water to boil, because if it does the custard will curdle. Remove from the heat, add the soaked gelatin to the custard, stir until it is dissolved, and set the mixture in a cold place. When it is slightly thickened, stir in the vanilla and one half of the

coconut, then fold in the stiffly beaten egg whites. Pour into a baked pie shell and sprinkle the remaining coconut on top. (See Plain Pastry recipe, p. 16.) Set in the refrigerator for 2 or 3 hours before serving.

COCONUT TURNOVERS

YIELD: 20 turnovers

2 cups flour
¾ teaspoon salt
⅔ cup fat
¼ cup water
½ cup butter
1 cup sugar
3 cups fresh grated coconut

Sift the salt and flour together. Cut or rub in the fat until well blended. Add the water slowly to make a stiff paste. Roll out on a slightly floured board to a thickness of ⅛ inch. Cut 4-inch circles for the turnovers.

Cream the butter and sugar well. Add the coconut and mix thoroughly. Place about 2 tablespoons of this mixture on each circle of pastry. Fold pastry over to form a semicircle and pinch the edges together. Bake in a hot oven (450° F.) for 30 to 40 minutes.

HAWAIIAN FREEZE

YIELD: 1½ quarts

6 cups grated coconut (2 coconuts)
3½ cups boiling water
} to yield 4¼ cups extracted coconut milk
⅞ cup coconut water
1⅛ cups sugar
½ teaspoon vanilla

Pour the boiling water over the grated coconut and allow to stand 15 minutes. Strain through poi cloth or a double thickness of cheesecloth, squeezing out as much of the milk as possible. Add the coconut water, sugar, and vanilla to the extracted coconut milk, and stir until the sugar is dissolved. Freeze in an ice-cream freezer, using 8 parts of ice to 1 part of ice-cream salt.

Grated coconut may be served over the frozen mixture.

COCONUT SHERBET

YIELD: 6 servings

2 coconuts
1¼ cups coconut liquid
} to yield 2 cups coconut milk
1 cup grated coconut
½ cup cow's milk
½ cup sugar
⅓ teaspoon vanilla

Remove the outer husk from the coconuts. Using a nail or ice pick, open two soft eyes at the end of the nut and drain the liquid from the coconuts through them. Crack the coconuts open and grate the meat. Set aside 1 cup grated coconut to be used later. To the coconut liquid add enough water to make 1¼ cups and heat to boiling. Pour hot liquid over the remaining grated coconut and allow to stand 15 minutes. Then knead coconut and liquid with the hands and squeeze through poi cloth or several thicknesses of cheesecloth. Squeeze

out as much milk as possible. There should be 2 cups coconut milk. Combine with the cow's milk, sugar, fresh grated coconut, and vanilla. Stir until sugar is dissolved and freeze in ice-cream freezer using 8 parts ice and 1 part ice-cream salt.

Variation: The mixture also may be frozen in a mechanical refrigerator tray but should be stirred every half hour during the freezing process.

FIG

DESCRIPTION. Different varieties of figs *(Ficus carica)* vary greatly as to size and color of flesh and skin. The leading variety grown in Hawaii is known as the Turkish Brown or Brown Turkey. It is pear-shaped, 1½ to 3 inches in diameter, and mainly of a mahogany red color if exposed to the sun. Others are green with cheeks or streaks of mahogany red-brown. The thin, easily bruised skin encloses a soft pinkish-white pulp and many tiny seeds. The fruit matures from a large number of small flowers which develop within a protecting shell. This accounts for the small hollow in the center of the pulp, around which can be seen a layer of seeds and tiny dried flowers. The flavor is sweet and pleasing.

HISTORY. The fig has been under cultivation for many centuries and is mentioned in the oldest European literature. Some variety was probably introduced into Hawaii near the beginning of the nineteenth century, because Don Marin records in his diary that figs were growing in his garden in 1809. This variety, which was probably the Mission fig from the Spanish missionaries in California, did not thrive at that time, but it has been recently reintroduced and is reported to be growing successfully on the island of Hawaii. The Kadota variety also is grown successfully there. The Brown Turkey is grown on all the Islands.

NUTRITIVE VALUE. The fresh fig has a low acid and a high sugar content. Compared with other fruits analyzed in this study, figs are a good source of calcium and are commonly eaten in larger quantities than several fruits which contain a higher percentage of this mineral.

Biological and chemical tests in the station laboratory have shown the Brown Turkey variety to be a poor source of vitamin A, thiamine, and ascorbic acid.

Fresh California figs have been reported to be a poor source of ascorbic acid and a fair source of vitamin A.

SUPPLY. The supply of best quality figs does not equal the demand at any time. They ripen throughout the year, but the main season is from May through July.

USE. Practically all the figs produced here are used in the fresh state. Superior flavor and texture may be had only in thoroughly ripened figs, there-

fore they should not be used in the half-ripe stage. A favorite way of serving them is as a breakfast or dessert fruit with cream and sugar. Excellent shortcakes, sherbets, puddings, preserves, and jams may be made from them.

FIG COCKTAIL

YIELD: 6 servings

4½ cups ripe figs (2¼ pounds)
½ to 1 cup orange juice
2 tablespoons sugar
2 tablespoons lemon juice or 1½ tablespoons lime juice

Wash, peel, and cut figs into small pieces. Add sugar to fruit juice and pour over the figs. Chill 1 hour before serving in cocktail glasses.

FIG-LITCHI COCKTAIL

YIELD: 6 servings

3 cups fresh figs, peeled and cut into cubes (1½ pounds)
1½ cups canned litchis (10-ounce can)
2 tablespoons lemon juice
½ cup liquor from canned litchis

Wash, peel, and dice figs. Cut litchis into quarters. Combine all ingredients and allow to stand in a cold place for 1 hour before serving in cocktail glasses.

Variation: Fresh litchis may be used and sweetened to taste.

FIG JAM

YIELD: 1½ quarts

10 cups figs, chopped and peeled (5 pounds)
5⅓ cups sugar
½ cup lemon juice

Peel and chop figs. Add sugar, then divide quantity into two kettles. Cook slowly until fruit is thick (about ½ hour). Stir frequently to prevent scorching; add lemon juice just before removing from stove. Pour into hot sterile jars and seal with paraffin.

If desired, 1½ tablespoons finely chopped fresh ginger root may be added with the sugar.

PICKLED FIGS*

YIELD: 3 pints

4 pounds ripe figs (about 24 large)
Whole cloves
4 cups sugar
2 cups vinegar
2 cups water
4 2-inch sticks of cinnamon or ½ teaspoon ground cinnamon

Wash figs. Stick two whole cloves in each fig. Cook sugar, vinegar, water, and cinnamon together for about 10 minutes or until the sirup is fairly thick. Add the figs and cook slowly until they are tender—about 1 hour. Place figs in hot sterilized jars, cover with boiling sirup, and seal at once.

* Contributed by University of Hawaii Agricultural Extension Service.

CANNED and PRESERVED FIGS

See page 122

FIG FILLING FOR CAKE

YIELD: 1½ cups

2 cups chopped peeled figs
⅔ cup sugar
⅔ cup water
2½ tablespoons lemon juice

Mix ingredients together and cook 45 minutes, or until figs are soft and the mixture is thick enough to spread. Cool and spread between layers of plain yellow or white cake.

FIG SHERBET

YIELD: 1½ quarts

4 cups strained ripe figs
¾ cup sugar
⅔ cup water
4 tablespoons lemon juice
3 tablespoons pineapple juice
2 egg whites

Chop figs and put through a strainer. Combine sugar and water, and boil 3 minutes. Cool and add fruit juice and unbeaten egg whites. Freeze, using 8 parts of ice to 1 part of ice-cream salt.

FIG ICE CREAM

YIELD: 1¾ quarts

3 cups strained ripe figs
1½ cups thin cream
1½ cups milk
1 cup sugar
¼ cup lemon juice

Chop figs and put through a strainer. Add remaining ingredients and freeze, using 8 parts of ice to 1 part of ice-cream salt.

FIG MOUSSE

YIELD: 6 to 8 servings

1⅔ cups strained fig pulp
¼ cup lemon or 2⅔ tablespoons lime juice
½ tablespoon gelatin
2 tablespoons cold water
⅔ cup sugar
½ cup boiling water
2 cups whipped cream or evaporated milk

Combine fig pulp and fruit juice. Add cold water to gelatin and press out all lumps. Combine sugar and boiling water and bring to the boiling point. Add gelatin and stir until it is dissolved. Cool and pour over the figs. Combine well. Chill and whip the cream until it is stiff. Fold into other mixture.

If evaporated milk is used, chill it in refrigerator freezing tray until small crystals begin to appear around the sides. Pour into chilled bowl and beat with a rotary beater.

Freeze mousse in mechanical refrigerator tray, or from 4 to 6 hours in a tightly sealed mold packed in ice and salt, using 3 parts of ice to 1 part ice-cream salt.

ISABELLA GRAPE

DESCRIPTION. The Isabella grape *(Vitis labrusca)*, the only variety of grape grown commercially in Hawaii, is an American seedling grape of the slipskin type. The bunches are from 4 to 6 inches long and very firmly packed. When ripe, the individual grapes are a deep purple-black with a light blue bloom and are about a half inch in diameter.

HISTORY. Grapes, grown throughout most of the world, are of many different types. They were introduced into Hawaii at an early date, since Captain Vancouver spoke of leaving grapevine plants and orange plants on March 4, 1792. Don Marin wrote of his vineyard in his diary in 1815, and recorded the making of wine. The grape Marin grew probably was the Mission grape from California, which has since disappeared. The date of the introduction of the Isabella grape into Hawaii is not known, but must have been after 1816, the date of the discovery of the Isabella as a seedling in South Carolina. Because it is grown largely by the Portuguese in Hawaii, it is often erroneously called a Portuguese or European type of grape.

NUTRITIVE VALUE. Grapes are of value in the diet largely because of their distinctive flavor and refreshing qualities. Their sugar content is similar to that of other fresh fruits of the same water content.

Isabella grapes were analyzed for minerals in two different conditions—(1) with seeds and skins removed and (2) with only seeds removed. The product with only seeds removed was a better (although only fair) source of calcium, phosphorus, and iron, than the one with seeds and skins both removed.

Isabella grapes were found to be a poor source of ascorbic acid. No tests were made to determine their vitamin A or thiamine content, but Daniel and Munsell have shown that the closely related Concord grape contains very little vitamin A or B and no ascorbic acid. These authors have also shown that commercial grape juice contains no demonstrable quantities of any of the vitamins.

The acids of Concord grapes have been shown to consist of approximately 60 percent malic acid and 40 percent tartaric acid, a large portion of which exists in the form of alkali salts.

SUPPLY. The supply available for the market is irregular and does not equal the demand. The main crop comes to the market in the summer, but some fruit may be seen during the other months of the year.

USE. This grape may be eaten fresh or used in making jelly, grape juice, or conserves.

GRAPE JUICE

YIELD: 2 quarts juice per 5 pounds grapes

Wash sound, ripe grapes, cover them with water, mash with potato masher, and heat slowly to the simmering point. Cook slowly until the fruit is very

soft; then strain through a jelly bag made of flannel or two thicknesses of a flour or sugar sack. Measure juice, place on heat, bring to boiling point, and add ⅓ to ½ cup of sugar to each quart of juice. Boil 3 minutes, pour into hot sterilized jars or bottles, and seal at once. (See p. 122 for canning directions.)

Grape butter may be made from the pulp. (See recipe below.)

GRAPE JELLY

YIELD: 5 cups jelly per 5 pounds grapes

Choose half-ripe grapes. Discard stems and any spoiled fruit. Wash the grapes and place them in a kettle with water. Use ⅓ pound of water, or ⅔ cup, for each pound of grapes. Mash fruit and cook slowly until it is very soft. Strain through a flannel bag or two thicknesses of a flour or a sugar sack. If a very clear jelly is desired, do not squeeze the bag.

Appendix I (p. 125) gives directions for making a pectin test. The amount of sugar to be used depends on the amount of pectin found in the juice.

Grape jelly should be made in small quantities, not over 3 cups of juice at a time, and the total boiling period should not be longer than 10 minutes. Measure the juice and place it in a shallow kettle with a capacity at least four times the volume of juice. Bring to the boiling point and boil rapidly for 5 minutes, then add the sugar. Remove the scum that forms when the mixture boils. Boil rapidly until the juice sheets off in large drops from a spoon. If a thermometer is used, boil until it reaches 105° C. or 221° F. on a clear day, and 106° C. or 222° F. on a rainy day. (See p. 126 for fuller description of jelly test.) Pour into hot sterile jelly glasses and seal with paraffin.

The pulp may be used to make grape butter. (See recipe below.)

GRAPE CONSERVE

YIELD: 2½ quarts

4 pounds grapes (6⅔ cups pulp and skins)
2½ cups seedless raisins
5 cups sugar
2½ cups chopped English walnut meats

Wash, pick over, and remove skins of ripe grapes. Heat pulp slowly until soft enough that seeds can be pressed out by rubbing pulp through a sieve. After seeds are removed, combine pulp and skins. Look over raisins, remove stems, and wash. Combine grapes, raisins, and sugar. Boil for 5 minutes. Add nuts and cook 5 minutes longer. Pour into hot sterile jars and seal with paraffin.

GRAPE BUTTER

YIELD: 1 quart

3 cups grape pulp from jelly extraction, measured after removal of seeds
3 cups sugar
½ cup grape juice

To remove seeds and skins press grape pulp through a coarse sieve. Measure, add sugar and grape juice. Cook slowly until thick. Stir frequently to prevent burning. Pour into hot sterile glasses and seal with paraffin.

SPICED GRAPES YIELD: 6 cups

3 pounds of grapes (2 quarts when removed from the stems)
¼ cup water
⅓ cup vinegar
1 teaspoon ground cinnamon
½ teaspoon ground allspice
¼ teaspoon ground cloves
4½ cups sugar

Wash and drain the grapes. Remove grapes from stems and measure. Remove skins and place skins and pulp in separate saucepans. Add water to skins, cover saucepan, and boil gently until skins are tender, or about 20 minutes. Cook pulp (without water) in another covered saucepan until seeds separate easily, or about 20 minutes. Strain to remove seeds.

Combine tenderized skins and juice with the strained pulp and the remainder of the ingredients. Cook until the mixture gives a good jelly test—20 to 25 minutes (see p. 126). Pour into sterilized glasses or jars and seal with paraffin.

CATTLEY GUAVA
(Strawberry Guava)

DESCRIPTION. In addition to the common lemon guava, there are two other kinds in Hawaii — the strawberry guava *(Psidium littorale,* syn. *Psidium cattleianum)** is dark red, and the other *(Psidium littorale* var. *lucidum),* is pale yellow when ripe. Both are small round fruits ¾ to 1½ inches in diameter that are quite different from the common guava. The center of the fruit is filled with a very juicy pulp and numerous small hard seeds. The flavor, which is sweet and somewhat acid, has but faint resemblance to that of the strawberry. Because the red guava produces a deep brown stain difficult to remove, care should be used in handling the fruit.

HISTORY. The Cattley or strawberry guava is a native of Brazil, from which country it has been carried to all parts of the world. According to Degener, the "Psidium Chinense" listed by Andrew Bloxam as "brought alive from England in the 'Blonde' to the Sandwich Islands and transplanted May 28, 1825" was probably the strawberry guava. It was introduced into Europe by way of China which accounts for the name "Chinese guava" as it is sometimes called. It is commonly called the Cattley guava after the English horticulturist William Cattley who fostered its cultivation in England in the early 1800's.

The fact that both guavas have Hawaiian names—the yellow variety being called the *waiawi* and the red the *waiawi ulaula*—also indicates that they were early introductions which became widely distributed and well established.

Because of its beautiful glossy deep-green leaves, the strawberry guava is sometimes grown in private gardens as an ornamental shrub. The yellow variety grows to a greater height, sometimes 30 to 40 feet. Both kinds thrive

* See fig. 5, p. 67.

best at elevations several hundred feet to one or two thousand feet above sea level.

NUTRITIVE VALUE. The fruit contains about twice as much calcium and about the same quantity of phosphorus as the common guava. Its calcium content is exceeded only by tamarinds and oranges with membrane.

No tests to determine the vitamin A or thiamine content of strawberry guavas have been made. Samples of the Cattley guava, both red (strawberry) and pale yellow, tested to date have been found to contain less ascorbic acid than the common guava, but they can be considered good to fair sources of this vitamin.

SUPPLY. The fruit ripens at intervals from May to November. It is seldom found in the markets.

USE. The strawberry guava is sweeter and has a more delicate flavor than the common guava. It is very delightful eaten fresh. The juice of the ripe or half-ripe fruit makes a pleasing acid drink or, combined with the juice of pineapple or citrus fruits, makes a delectable punch. Strawberry guavas are not extensively used for jelly, but if a few are added to the half-ripe common guava, a very attractive pink-colored jelly is obtained. Strawberry guava marmalade and preserves are delicious but laborious to prepare because the fruit is small, and removing the seeds is tedious.

HALF-RIPE STRAWBERRY GUAVA-ADE

YIELD: 6 servings

3¾ cups half-ripe strawberry guava juice
2 cups water
1⅛ cups sugar

Prepare juice as directed for making guava jelly (p. 41). Mix ingredients and pour over cracked ice.

RIPE STRAWBERRY GUAVA-ADE

YIELD: 6 servings

6 cups ripe strawberry guava juice
1½ cups sugar

Prepare juice as directed for making guava jelly (p. 41). Mix ingredients and pour over cracked ice.

HALF-RIPE STRAWBERRY GUAVA PUNCH

YIELD: 6 servings

3 cups half-ripe strawberry guava juice
⅔ cup lemon juice
2 cups orange juice
1½ cups sugar

Prepare juice as directed for making guava jelly (p. 41). Mix ingredients, stir until sugar is dissolved, and pour over cracked ice.

COMMON GUAVA

DESCRIPTION. The guava *(Psidium guajava)** is a medium-sized, round, or oblong yellow fruit 1½ to 3 inches in diameter, with a thick, coarse, edible rind surrounding a mass of seeds imbedded in a firm, soft pulp. The flesh varies from white to yellow to red. Though the fruit may be either sweet or sour, it always has a distinctive, characteristic flavor.

HISTORY. Although Thrum's Hawaiian Annual has stated that the common lemon guava was brought to the Hawaiian Islands from Australia by G. Montgomery in 1851, some variety was undoubtedly growing in the Islands before that, for Sereno E. Bishop, a clergyman born at Kailua, Hawaii, in 1824, stated in Reminiscences of Old Hawaii that guavas were a choice fruit in the later 1830's and did not become wild until 20 years later. At present the guava is the most common wild fruit in the Territory. It grows well under conditions unfavorable for many plants, and in some places has become a pest. The word "guava" comes from the Haitian name for the fruit, *guayaba.*

NUTRITIVE VALUE. Because of the high nutritive value of guavas, greater use than at present should be made of those which grow wild in great abundance at the lower altitudes on all the Islands.

Compared with other fruits described here whole guavas are a good source of iron, and a fair source of calcium and phosphorus. However, four-fifths of the iron is in the seeds and therefore not utilizable.

Data in appendix III (p. 128) show that guavas are a fair source of vitamin A, a poor source of thiamine, and an excellent source of ascorbic acid.

The thick rind portion of the common guava contains more ascorbic acid than the pulp and seeds, both because there is a greater proportion of the rind than pulp in each guava, and because per unit of weight the rind is richer in ascorbic acid.

A watery extract of guavas, called guava juice (p. 42), is an excellent source of ascorbic acid. Samples prepared in the laboratory have tested from 70 to 130 milligrams of ascorbic acid per 100 cubic centimeters.

Fifty samples of home-canned guava products—14 of guava pulp, 6 of pulpy juice, and 30 of strained juice†—were collected from different localities on four islands. The samples varied in their ascorbic acid content from 32 to 130 milligrams per 100 cubic centimeters with an average of 66 milligrams. This means that one may easily obtain a day's quota of ascorbic acid from ⅓ to ⅔ of a cup of home-prepared guava juice or pulp.

A number of factors influence the vitamin content of prepared guava products, e.g., (1) the original ascorbic acid content of the guavas, (2) the quan-

* See fig. 6, p. 68.

† Most of the samples were obtained by the home agents of the University of Hawaii Agricultural Extension Service through the courtesy of Kathryn Shellhorn, Assistant Director.

tity of water used in preparation of the product, (3) contact or contamination with metals, especially copper which tends to destroy the vitamin, (4) exclusion or inclusion of air, (5) length of storage, (6) and contact with light.

Certain data obtained to date indicate that guavas which ripen in the fall have more ascorbic acid than those ripening in the spring. Also, indications are that guavas at the beginning or the height of the season contain more ascorbic acid than those ripening at the end of the season. However, these problems and others relating to the ascorbic acid content of guavas in Hawaii should be given more detailed and extensive study.

The guavas with the highest ascorbic acid content found to date (100 to 300 milligrams per 100 grams) have been sweet guavas growing wild. Otherwise flavor is no indication of the vitamin content.

To obtain guava juice and pulp of high vitamin content the following recommendations should be observed: (1) use guavas of good quality at the height of the fall season and prepare as soon after picking as possible; (2) use aluminum, stainless steel, or enamel kettles that are not chipped for cooking; (3) cook sliced guava in only enough water to nearly cover them; (4) use a strainer free from copper or rust for draining the pulp (an aluminum or enameled colander is satisfactory if followed by a poi cloth for pulp or a jelly bag for juice); (5) fill the bottle or container to be used for canning to the very top with the boiling hot product before putting on cover or cap (the space at the top is then a vacuum and not air containing oxygen); (6) put juice in dark bottles if you cannot store them away from light (juice in light-colored bottles seems to keep as well as that in dark bottles if well protected from light); (7) use preserved products within a year because even when properly prepared, sealed, and stored there seems to be a slow but definite loss of ascorbic acid (approximately 30 percent in one year according to our experiments).

Cooked guava juice or pulp keeps well in the refrigerator. However, it is well not to store it for more than a week. Experiments have shown that bottled guava juice once opened, even though tightly covered, loses ascorbic acid rather rapidly. The flavor and color do not seem to be impaired after a month's storage but in two weeks' time the guava juice has been found to lose one-third to two-thirds of the original ascorbic acid content and in four weeks to have lost practically all.

The high nutritive value of the guava is due to the large quantity of ascorbic acid it contains. This fact merits horticulturists' giving attention to the development of varieties having maximum values of ascorbic acid, and commercial producers', to the establishment of canneries for guava juice and other guava products on a large scale.

SUPPLY. Guavas are most plentiful from June to October, but small quantities may be obtained at other seasons. They are not to be found in the Honolulu markets at any time of the year, for no attempt is made to pick and offer them for sale.

USE. The common guava may be used as a fresh fruit, served with sugar for dessert and shortcake, or may be combined with citrus fruit and pineapple in cocktails and salads. Guava juice makes an excellent substitute for orange or tomato juice in child feeding and makes a pleasing addition to punch. The guava is highly prized for jelly making because of its distinctive flavor and high pectin and acid contents. It also may be used for butters, jams, marmalades, and preserves. The pulp remaining after the juice has been extracted for jelly making may be used for guavalets, guava catsup, butter, or jam. The type of confection called guava paste may be made by evaporating the strained guava pulp until it is very thick. This paste is sold commercially in many parts of the world.

GUAVA JELLY

Choose half-ripe, sour guavas. Wash, remove blossom end, and cut into quarters or slices. Add ¾ pound (1½ cups) water to each pound of guavas. This amount of water should almost cover the guavas. Boil gently for 15 to 20 minutes until fruit is very soft. Strain through a flannel jelly bag or two thicknesses of a sugar or a flour sack. Do not squeeze bag in extracting the juice. If desired, a second extraction of juice may be made from the same pulp by adding water and boiling again. The second extraction will have almost as much pectin but not so much acid as the first. When jelly is being made a small amount of lemon juice may be added to increase the acid.

The amount of acid and pectin present in guavas varies with the maturity of the fruit and locality where it is grown. A test for pectin may be made by adding 1 tablespoon of grain alcohol to 1 tablespoon of juice. If the mixture becomes thick and gelatinous, there is considerable pectin present, and 1 to 1¼ cups of sugar should be used for each cup of juice. When less pectin is present, less sugar should be used. For half-ripe guavas from Manoa Valley, 1 or 1⅛ cups of sugar to 1 cup of juice usually proves the best proportion for the first extraction juice.

The jelly should not be made in quantities larger than 3 cups at one time, as a dark gummy jelly will result from long cooking. Since short cooking and rapid evaporation are desirable in jelly making, a shallow kettle with a capacity four times the measure of juice should be used.

Bring juice to the boiling point. If more than 2 cups are used, boil from 5 to 10 minutes before adding sugar. Remove scum which forms on top after sugar is added. Test jelly by allowing juice to drip from a spoon; remove kettle from heat while testing. When three or four drops run together and "sheet" off the spoon in one large drop, the jelly is done. Jelly may also be tested with a thermometer; heat to 105° C. or 221° F. on a clear day, and to 106° C. or 222° F. on a rainy day.

Pour jelly into hot sterile glasses and seal with paraffin. Pulp remaining after juice is extracted may be used for guava catsup, butter, jam, or guavalets.

PURPLE-FLESHED JAVA PLUM AND GUAVA JELLY See page 53

KETAMBILLA-GUAVA JELLY See page 55

GUAVA JUICE

YIELD: 1½ quarts

4 pounds or 48 to 50 medium-sized, firm, ripe guavas
1 pound or 2 cups of water (barely sufficient to cover sliced guavas)

Wash, remove blossom end, and cut guavas into slices. Add water, bring to boiling point quickly, and boil gently for 15 minutes. Strain through a flannel jelly bag or two thicknesses of a sugar or flour sack. Heat juice to boiling point, pour into hot sterile jars and seal, or pour into bottles and cap with commercial capper immediately. Juice not canned will keep approximately a week in a refrigerator.

Because of its high ascorbic acid content, guava juice makes an excellent substitute for orange or tomato juice in child feeding (see p. 40). Dilute with an equal quantity of water for a very young child and, if desired, sweeten with a very small amount of sugar.

The juice may also be canned to use for fruit punch or as a breakfast fruit juice.

GUAVA SIRUP*

YIELD: 2 quarts

4 cups guava juice
4 cups water
6 cups sugar

Prepare juice as directed in recipe for guava jelly. Combine juice, water, and sugar. Boil slowly for 30 minutes, or until proper consistency for sirup. Pour into hot sterile jars and seal. Use on griddle cakes, as sauce for ice cream and puddings, or in guava milk shakes.

GUAVA SAUCE

YIELD: 1 cup

1 tablespoon cornstarch
½ cup sugar
½ cup unsweetened guava juice
½ cup boiling water
2 tablespoons butter or oleomargarine
Few grains salt

Combine sugar and cornstarch and make a smooth paste by slowly adding the guava juice. Stir into boiling water gradually. Continue stirring until the sauce thickens. Add butter and salt and serve hot or cold on griddle cakes, waffles, puddings, and ice cream.

* Contributed by University of Hawaii Agricultural Extension Service.

STEWED GUAVAS

YIELD: 6 servings

12 to 15 soft ripe guavas
½ cup water
1/16 teaspoon salt
½ to ¾ cup sugar

Wash and peel guavas. Cut in half, remove the pulp, and press through a strainer, discarding the seeds. Cook the guava pulp and shells in water until tender. Add sugar and salt a few minutes before guavas are done. Serve hot or cold as a breakfast or dessert fruit. It may also be served with shortcake, or over ice cream, baked custard, bread or cereal puddings.

Stewed guavas may be canned for future use (see appendix I on canning).

GUAVA MILK SHAKE

YIELD: 1 large glass

1 cup milk
1 ⅓ tablespoons guava sirup or 4 tablespoons guava juice
1 ½ teaspoons sugar, if juice is used

Combine ingredients, pour into a glass jar, and cover with a tight-fitting lid. Chill and then shake ingredients thoroughly. Serve in a tall glass.

GUAVA DELICIOUS

YIELD: 6 servings

8 large ripe guavas
1 large ripe banana
¾ cup sugar
½ cup whipping cream or 1 cup grated coconut

Select soft ripe guavas. Wash, peel, and cut in halves. Scoop out the pulp and press through a coarse sieve to remove the seeds. Measure pulp (there should be approximately ¾ cup) and add sugar. Slice the guava shells in ⅓-inch pieces and the banana in thin pieces.

Place a layer of guavas in a serving dish and cover with sliced bananas. Continue filling dish with alternating layers of guava and banana until fruit has all been used. Pour pulp over the top, cover dish, and chill for 2 to 3 hours. Serve with whipped cream or grated coconut on top.

GUAVALETS*

YIELD: 1 ¾ pounds

2 cups strained cooked guava pulp (pulp left from jelly making may be used)
3 ½ cups sugar
¼ tablespoon gelatin
2 tablespoons cold water
½ cup chopped English walnuts

Cook pulp and sugar together over a very slow fire until mixture is very thick and seems to leave the sides of the pan. Stir frequently to prevent burning. Soak gelatin in cold water for 5 minutes, melt over hot water, and add to guava pulp. Remove from heat, cool, add nuts, and pour into a buttered shallow pan. When cold cut into 1-inch squares and wrap each piece in waxed paper.

* Contributed by University of Hawaii Agricultural Extension Service.

GUAVA BUTTER

YIELD: 1¼ quarts

8 cups cooked guava pulp (pulp left from jelly making may be used)
6 cups sugar
6 tablespoons lemon juice (2 lemons) or 4 tablespoons lime juice
3 tablespoons grated fresh ginger root
¾ teaspoon ground allspice
¾ teaspoon ground cinnamon

Press guava pulp through a sieve before measuring the quantity. Add remaining ingredients. Cook slowly until thick, stirring frequently to prevent burning. Pour into hot sterile jars. Cool and cover with paraffin.

GUAVA CATSUP*

YIELD: 2½ quarts

5 medium-sized onions, finely sliced
¼ cup water
3 quarts guava pulp (pulp left from jelly making may be used)
2 large cloves of garlic, finely sliced
5 small peppers, finely chopped (seeds removed) or ⅛ teaspoon ground pepper
1½ to 2 cups vinegar
4 teaspoons ground allspice
3 teaspoons ground cinnamon
2 teaspoons ground cloves
6 cups sugar
1 tablespoon salt

Cook onion in the water until it is soft. Combine all the ingredients and cook for 30 to 40 minutes. Pour into hot sterilized jars and seal immediately. This is excellent to serve with meat or avocados.

GUAVA-PAPAYA JAM

YIELD: 1½ quarts

4 cups cooked guava pulp
4 cups fresh papaya pulp
Grated rinds of 2 lemons
8 cups sugar
6 tablespoons lemon juice

Combine fruit pulp and cook until most of the water has been evaporated. Add sugar and lemon and cook until thick. Pour into hot sterile jars. Cool, then seal with paraffin.

GUAVA MARMALADE I

YIELD: 1¼ pints

2 pounds whole ripe guavas (25 medium-sized guavas)
3 cups sugar
1 cup water
⅛ cup thin lemon slices cut in halves
¾ teaspoon grated green ginger root

Wash guavas, remove blossom end and blemishes. Cut fruit into halves. Remove soft inner pulp and seeds with a spoon and use this pulp for guava ice

* Contributed by University of Hawaii Agricultural Extension Service.

cream, mousse, or cake icing. Cut guava shells into strips 1/3-inch wide, cover with sugar, add water, and allow to stand 3 to 4 hours. Add ginger root and lemon. Boil until sirup is slightly thick, but not until it gives a jelly test. Pour into hot sterile jars and seal at once.

GUAVA MARMALADE II

YIELD: 5 pints

4 pounds guavas
8 cups sugar
2 cups water
¼ cup thin lemon slices, cut in halves
1 ½ teaspoons grated green ginger root

Wash guavas, remove blossom end and blemishes. Cut fruit in halves and remove soft inner pulp and seeds with a spoon. Add 1½ cups of water to the inner pulp and seeds, and cook until seeds separate from pulp. Force through a fine colander, then put through poi cloth to remove small seeds. Cut guava shells in strips 1/3 inch wide, pour sieved pulp and sugar over them, and allow to stand 3 to 4 hours.

Add ½ cup of water to sliced lemon, allow to stand about 3 hours, and then boil gently until rind is clear. Add cooked lemon and ginger root to guavas and cook until the mixture gives a slight jelly test. Pour into hot sterile jars and seal at once.

GUAVA-PINEAPPLE MARMALADE

YIELD: 1 ¼ pints

4 cups sliced guava shells (about 25 guavas)
3 ½ cups sugar
¾ teaspoon finely chopped fresh ginger root
¼ cup thinly sliced lemon or 3 ½ tablespoons lime juice
2 cups shredded fresh pineapple
1 cup water

Prepare guava shells and cook as directed in recipe for Guava Marmalade I. Add pineapple at beginning of the cooking period.

GUAVA PICKLE

YIELD: 2 pints

30 large firm ripe guavas
4 1/3 cups sugar
1 cup water
¾ cup mild vinegar
2 dozen whole cloves
2 sticks cinnamon or ½ teaspoon ground cinnamon

Wash guavas. Remove stem, blossom end, and blemishes; cut guavas in half. Remove pulp and save for use in guava desserts. Tie spices in a piece of cheesecloth. Combine guava shells and all other ingredients. Allow to stand 3 to 4 hours, then simmer for 1 hour or longer until fruit is tender. Remove spice bag. Pour into hot sterilized jars and seal.

CANNED GUAVA PULP, SLICES, and JUICE

See page 123

GUAVA AND PEANUT BUTTER SPREAD

YIELD: ¾ cup

½ cup guava butter or jam
¼ cup peanut butter

Add guava butter to peanut butter and stir until well mixed. Use as a sandwich spread.

FRESH GUAVA-FRUIT PUNCH

YIELD: 6 servings (1 cup each)

½ finger of fresh ginger root
1 ½ cups water
6 ripe guavas
3 cups medium-strength tea
¾ cup sugar
¾ cup orange juice
½ cup pineapple juice
¼ cup lemon juice

Peel ginger root and chop fine. Boil with ½ cup of the water until a strong ginger flavor is obtained. Cool and strain through a cloth, squeezing ginger root. Wash guavas, cut, and press through a fine sieve to remove seeds. Combine all ingredients, stir until sugar is dissolved, and pour over cracked ice before serving.

ALOHA PUNCH

YIELD: 12 servings (1 cup each)

2 cups sugar
4 cups water
2⅔ cups unsweetened guava juice
2⅔ cups orange juice
1 ⅓ cups lemon juice
1 ⅓ cups shredded pineapple
Grated rinds of 1 orange and 1 lemon
A few drops of red coloring

Boil sugar and water for 3 minutes. Cool and add fruit juice and pineapple. Pour over cracked ice before serving.

MANOA FRUIT PUNCH

YIELD: 100 servings (⅓ cup each)

1 fresh ginger root
7 cups water
7 cups sugar
6 cups guava juice
9 cups fresh pineapple juice
10 cups orange juice (4 dozen small-sized oranges)
2 cups lemon juice (1 dozen lemons)
½ cup finely chopped fresh mint leaves

Peel ginger root and chop fine. Boil with 3 cups of the water until a strong ginger flavor is obtained. Cool and strain through a cloth, squeezing the ginger root. Boil the sugar and the remaining 4 cups of water to make a sirup, then cool. Combine all ingredients and pour over cracked ice. If the punch is too strong dilute with cold water.

BANANA-GUAVA NECTAR

See page 13

HOT SPICED GUAVA JUICE

YIELD: 3¾ cups

2 cups water
12 cloves
½ teaspoon ground or crushed cinnamon bark
½ teaspoon grated fresh ginger root (if desired)
8 circles lemon rind, the size of a dime
2 cups guava juice
2 teaspoons lemon juice
Sugar to taste

Tie spices loosely in a cloth. Add spices and lemon rind to water. Cover and boil for 10 minutes. Add fruit juices and sugar and heat to simmering point. Serve hot in small punch glasses, placing a piece of lemon rind in each glass.

GUABANAS

See page 14

GUAVA WHIP

YIELD: 6 servings

1 tablespoon gelatin
¾ cup water
¾ cup sugar
1 cup fresh or canned guava pulp
¼ teaspoon salt
1 tablespoon lemon juice
1 cup fresh shredded coconut (if desired)
2 egg whites

Soak gelatin in ¼ cup of the water. Add remaining water to sugar and heat to the boiling point. Add gelatin and stir until dissolved. Press guava pulp through a sieve, add salt and lemon juice, and gradually beat in the cooled sirup. Set in a cool place. When the mixture begins to thicken, fold in coconut and stiffly beaten egg whites. Pour into molds and chill before serving. Serve with shredded coconut, cream, or whipped cream.

GUAVA TAPIOCA

YIELD: 6 servings

¼ cup minute tapioca
1 ½ cups water
¼ cup sugar
⅛ teaspoon salt
2 tablespoons lemon juice
Grated rind of ½ lemon
1 ½ cups cooked guava slices (sweetened)

Combine tapioca, sugar, salt, and water. Bring to the boiling point over direct heat, place over boiling water, and cook until tapioca is transparent. Cool, add guava slices, lemon juice, and rind. Add more sugar if necessary. Pour into sherbet glasses or serving bowl and chill. Serve with milk, cream, or soft custard.

Unsweetened guava pulp may be used in place of guava slices, if the sugar is increased to ¾ cup.

GUAVA CHIFFON PIE

YIELD: 6 to 8 servings

1 tablespoon gelatin
¼ cup water
1 cup sugar
⅔ cup strained guava pulp (unsweetened)
4 egg yolks
3 to 4 tablespoons lemon or lime juice
¼ cup guava juice
4 egg whites
⅛ teaspoon salt
1 baked 9-inch pie shell
½ cup sweetened whipped cream (if desired)

Soak gelatin in water, then place over hot water until it melts. Combine ½ cup of the sugar, guava pulp, and egg yolks. Beat until well mixed. Cook over hot water stirring constantly until it thickens. Add gelatin, remove from heat and stir until thoroughly combined. Cool and add fruit juice. When guava mixture begins to congeal, beat egg whites and salt until stiff. Add ½ cup sugar and beat until the mixture is glossy. Gently fold the guava mixture into beaten egg whites, pour into pie shell, and place in refrigerator to chill. (See Plain Pastry recipe, p. 16.) Before serving, the filling may be spread with whipped cream sweetened to taste.

Variation: An uncooked filling may be made by using the Guava Ice Box Cake Filling recipe (p. 49).

GUAVA BROWN BETTY

YIELD: 6 servings

¼ cup butter or butter substitute
1 ⅛ cups dry bread crumbs
⅜ cup sugar
⅓ teaspoon cinnamon
⅓ teaspoon nutmeg
1 ½ cups sweetened stewed guavas, cut in ¼-inch slices
3 tablespoons lemon juice
1 to 2 tablespoons water

Melt butter or butter substitute and blend with crumbs. Combine sugar and spices. Cover bottom of baking dish with a thin layer of crumbs, add part of the guavas, sprinkle with the sugar and spice; continue adding alternate layers of crumbs, guavas, and sugar. Cover the top with crumbs. Mix lemon juice and water, pour over the mixture, cover the dish and bake for 30 minutes in a moderate oven (350° F.). Remove cover near end of the baking period and allow crumbs to brown. Serve warm with cream or top milk.

Variation: Use fresh instead of stewed guavas. Wash and cut 8 to 10 guavas in halves. Remove seeds and press pulp through a coarse sieve. Cut shells into slices and combine with pulp to make 1½ cups. Increase sugar to 1¼ cups and baking time to 45 minutes.

GUAVA ICEBOX CAKE*

YIELD: 6 servings

1 tablespoon gelatin
3 tablespoons cold water
⅔ cup sugar
3 tablespoons boiling water
⅔ cup fresh or cooked guava pulp (press through sieve before measuring)
⅓ cup shredded pineapple
2 tablespoons lemon juice
2 beaten egg whites
8 ladyfingers
½ cup whipping cream

Soak gelatin in cold water a few minutes. Add the gelatin and the sugar to boiling water and stir until dissolved. Cool and add fruit pulp and juice. Mix thoroughly and place in refrigerator to congeal. When the mixture is partially congealed, beat until foamy and fold in beaten egg whites. Line a mold with halves of ladyfingers. Pour in mixture and chill from 4 to 6 hours. Turn out on large plate and garnish with whipped cream and guava jelly.

Variation: Use thin slices of sponge cake instead of ladyfingers.

GUAVA SAUCE CAKE

YIELD: 1 square 8-inch layer

⅔ cup fat
1 ¼ cups sugar
1 egg
1 ¾ cups flour
¼ teaspoon salt
1 teaspoon soda
½ teaspoon ground cinnamon
½ teaspoon ground cloves
¼ teaspoon nutmeg
1 cup cooked guava pulp (unsweetened)
1 cup raisins

Cream fat and sugar. Add egg and beat vigorously. Sift flour, salt, soda, and spices. Dust raisins lightly with flour. Add dry ingredients and guava pulp alternately to sugar mixture. Add raisins and pour into well-oiled square cake pan. Bake 30 to 40 minutes at 350° F.

Guava pulp should be thin. Add liquid, either water or guava juice, if necessary.

Variations: (1) Chopped nuts may be substituted for half the raisins. (2) Omit ¼ to ⅓ cup flour and substitute the same amount of rice middlings for it.

GUAVA ICING

YIELD: 1 ½ cups

½ cup fresh guava pulp
⅔ cup sugar
½ egg white (1 ½ tablespoons)
½ teaspoon vanilla

Combine ingredients in a mixing bowl. Beat with Dover egg beater for 20 minutes, or until the mixture is of the proper consistency to spread on cake.

* THURSBY, ISABELLA S. THE GOODLY GUAVA. Fla. Univ. Agr. Ext. Bul. 70.

GUAVA DUMPLINGS*

YIELD: 6 to 7 servings

2 cups flour
1 teaspoon baking powder
¾ teaspoon salt
½ cup fat
3 to 4 tablespoons ice water
1 cup sugar
⅛ teaspoon salt
1 teaspoon cinnamon (if desired)
6 large or 7 medium-sized thoroughly ripe sour guavas (sweet guavas may be used if 3 tablespoons lemon or 2 tablespoons lime juice are added to strained pulp)
1 tablespoon butter

Sift flour with baking powder and ¾ teaspoon salt. Work in half of fat until thoroughly blended. Work in other half until pieces are about the size of small peas. Sprinkle with just enough water to make small balls which hold together. Divide dough into 6 or 7 equal parts, place on slightly floured board and roll each one into a round piece about ⅛-inch thick.

Wash guavas, remove blemishes, and peel if desired. Cut in halves, scoop out pulp, and press it through a sieve. Add sugar and ⅛ teaspoon salt and let stand a few minutes. Place two half shells of guava, one inside the other, in center of a piece of dough. Fill with pulp. Sprinkle with cinnamon and dot with butter. Lift edges of the dough and press together at the top. Place in greased muffin tins or baking dish. Bake at 425° F. for 10 minutes, reduce heat to 375° F. and bake for 25 minutes. Serve hot with top milk, cream, or guava sauce.

Remaining guava pulp may be thinned with water and cooked several minutes until sugar is dissolved. Serve as a sauce over the dumplings.

GUAVA MILK SHERBET†

YIELD: 1 ¼ quarts

2 ¼ cups canned unsweetened guava juice (No. 2 can)
1 ⅛ cups sugar
2 tablespoons lemon or 1 ½ tablespoons lime juice
1 ¼ cups thin cream or evaporated milk
2 egg whites
1/16 teaspoon salt

Boil 1 cup guava juice and 1 cup sugar together for 3 minutes. Cool and add the remaining guava and lemon juice. Place this mixture in a mechanical refrigerator tray and allow it to freeze. Remove the guava mixture to a chilled mixing bowl and beat with an egg beater until the mixture is fluffy. Add the cream and fold in the stiffly beaten egg whites to which the salt has been added. Pour the sherbet into the refrigerator tray and freeze.

* Adapted from recipe furnished by the University of Hawaii Agricultural Extension Service.

† BAZORE, KATHERINE. HAWAIIAN AND PACIFIC FOODS. New York. 1940.

GUAVA ICE CREAM

YIELD: 1 ½ quarts

2½ cups fresh guava pulp
2 tablespoons lemon juice
1 cup fresh whole milk or thin cream
1 cup evaporated milk
2 cups sugar

Press the guava pulp through a sieve and add lemon juice. Combine the fresh milk or cream with the evaporated milk. Add the sugar and stir until it is dissolved. Combine with other ingredients and freeze, using 8 parts of ice to 1 part of ice-cream salt.

GUAVA MOUSSE

YIELD: 6 to 8 servings

1 cup fresh guava pulp
1 tablespoon lemon juice
¾ cup sugar
2½ cups whipping cream or
1 cup evaporated milk and
⅓ cup whipping cream

Wash guavas, cut open, and remove inner pulp with a spoon. Press pulp through a sieve to remove seeds. Add sugar and lemon juice to pulp. If evaporated milk is used, chill it thoroughly by surrounding with ice, or placing in freezing pan in mechanical refrigerator until tiny crystals begin to appear around the sides. Pour chilled evaporated milk or cream into chilled bowl and whip until it thickens. Fold in the guava mixture and freeze from 4 to 6 hours in mechanical refrigerator, or pour into mold, seal well, and pack in 3 parts of ice and 1 part of ice-cream salt.

Variations: Canned guava pulp may be substituted for fresh guavas. For additional flavor add ½ cup unsweetened guava juice and double the quantity of lemon juice. Add more sugar if mixture does not taste sweet.

JAVA PLUM

(Jambolan)

DESCRIPTION. The Java plum or jambolan *(Eugenia cumini)** is a small dark maroon or purple fruit about the size and shape of an olive. There are at least two varieties in Hawaii, one with a small somewhat irregular-shaped fruit and one with slightly larger symmetrical olive-shaped fruit. The smaller variety has purple flesh and the larger type has a whitish flesh. Some trees produce better quality fruit, both in size and flavor, than others. The white-fleshed Java plum is sweeter and less astringent than the purple-fleshed variety. The astringent quality is believed to be due to the presence of tannins.

* See fig. 7, p. 69.

The Java plum tree, with handsome green foliage the year round, grows to a height of 40 to 50 feet. It produces a large quantity of fruit which fall to the ground and stain everything with which they come in contact. It is often considered an undesirable tree in Hawaiian gardens and along roadways or streets because of the unsightly litter produced beneath the trees.

HISTORY. It is not known by whom and just when the Java plum was introduced into Hawaii, but it has been a familiar tree for many years. Since it is mentioned by Hillebrand it must have been growing in the Islands before 1870 and may have been introduced by him.

Birds have scattered the fruit and seeds far and wide so now the tree (especially the purple-fleshed variety) grows in a semi-wild state in many valleys at lower elevations and up to 4,000 to 5,000 feet on all the Islands.

NUTRITIVE VALUE. The Java plum is a fruit high in sugars and organic acids. It is a fair to good source of ascorbic acid.

SUPPLY. Java plums do not appear on the Honolulu markets but ample supplies of the fruit can usually be obtained from trees in vacant lots and along roadways in late summer and fall.

USE. Because of their astringent qualities, the fresh fruits of both the purple- and white-fleshed varieties pucker the mouth and are undesirable to eat out of hand though many Island children seem to enjoy them.

The purple-fleshed fruits produce a strong-flavored, deep purplish-red juice that makes an excellent jelly when combined with guava juice.

Because the purple-fleshed fruits contain little or no pectin, it is necessary to combine the juice with that of a fruit of high pectin content or use commercial pectin in order to make jelly.

In contrast with the purple-fleshed fruit, the white-fleshed Java plum contains relatively large amounts of pectin. Jelly made from the white-fleshed plum gives the best texture when it is cooked only until a faint jelly test is obtained; otherwise it becomes too stiff on standing. Tough jelly is produced if the juice is cooked until it gives a good jelly test. The jelly made from the juice of the white-fleshed plum is mild flavored. In order to obtain a stronger plum flavor, as much juice as possible should be pressed from the cooked pulp. This does not detract from the appearance of the product, since the drained juice does not yield a clear or transparent jelly. One tablespoon lemon juice should be added to each cup of juice if a tart jelly is desired.

If both the white-fleshed and purple-fleshed varieties are available, jelly of good consistency and pronounced flavor can be made by combining the two in equal proportions and using ¾ cup sugar to each cup of juice.

Jam may be made from the pitted fruit of the white-fleshed variety, but it is not recommended because the astringent quality of the plum is retained in the pulp.

Juice or pulp of the ketambilla (p. 54), which is high in acid, combines well with the juice of the white-fleshed plum, which is low in acid and high in pectin.

PURPLE-FLESHED JAVA PLUM JUICE

YIELD: 4 cups

8 cups firm ripe plums
1 ¼ cups water

Wash plums and remove the stems. Place in kettle with water and cook until fruit is soft, 20 to 25 minutes. Pour into a thick jelly bag and allow the juice to drain. Do not squeeze the bag. Allow sediment in juice to settle before pouring off the clear liquid for jelly.

PURPLE-FLESHED JAVA PLUM AND GUAVA JELLY

YIELD: a) 2¾ cups; b) 3 cups

a) 1 cup Java plum juice
1 ¼ cups half-ripe guava juice
2 cups sugar

or

b) 1 cup Java plum juice
2 cups half-ripe guava juice
2½ cups sugar

Combine juices and boil in a broad shallow pan for 2 to 3 minutes. Add sugar, stir until dissolved, and boil rapidly until it gives the jelly test (see p. 126). Remove scum, pour into hot sterilized glasses, and seal with paraffin.

PURPLE-FLESHED JAVA PLUM JELLY

YIELD: 7 cups

1 ¾ cups Java plum juice
1 ¼ cups water
½ cup lemon juice
7 cups sugar
4 ounces liquid commercial pectin (½ cup)

Combine water and juice; bring to boiling. Add sugar and heat to boiling quickly; add pectin, stirring constantly. Allow to come to a brisk boil and boil vigorously for ½ minute. Remove from fire, skim, and pour quickly into hot sterilized glasses. Seal with paraffin.

WHITE-FLESHED JAVA PLUM JUICE

YIELD: 4 cups

10 cups firm ripe plums
2 cups water

Wash plums and remove the stems. Half cover plums with water and cook rapidly until fruit is soft, about 20 minutes. Pour into a jelly bag and allow juice to drain. Squeeze the bag to obtain all the juice; allow sediment to settle before pouring off the clear liquid for jelly.

WHITE-FLESHED JAVA PLUM JELLY

YIELD: 4 cups

4 cups plum juice
3 cups sugar
3 to 4 tablespoons lemon juice (if desired)

Boil juice in broad shallow pan for 2 to 3 minutes; add sugar and boil rapidly until it gives a faint jelly test. Skim, pour into hot sterilized glasses, and seal with paraffin.

Caution: A stiff tough jelly results from cooking until a positive jelly test is obtained.

Variation: For a sweet jelly use 1 cup sugar to 1 cup juice and if desired omit lemon juice.

WHITE-FLESHED JAVA PLUM AND KETAMBILLA JELLY

YIELD: 3 cups

1 ¼ cups white-fleshed plum juice
¾ cup ketambilla pulp and juice (see p. 55)
½ cup water
2 teaspoons lemon juice
3 cups sugar

Combine juices and water. Boil in a broad shallow pan for 2 to 3 minutes, add sugar, and boil rapidly until a good jelly test is obtained. Skim, pour into hot sterilized glasses, and seal with paraffin.

KETAMBILLA

DESCRIPTION. In size and shape the ketambilla *(Dovyalis hebecarpa)** resembles a small plum or cherry. It is globe-shaped and varies from about ½ to slightly more than 1 inch in diameter. The ketambilla has a thin, tough, deep purple skin covered with short grey-green hairs which give it a velvety or frosted appearance. It has 9 to 12 small seeds imbedded in the fibrous, deep maroon or purple flesh. It is strongly acid in flavor and stains a deep red or purple.

The fruit hang by short stems on the under side of the thorny branches of a large shrub that grows to a height of 10 to 15 feet.

HISTORY. The ketambilla is a native of Ceylon and is sometimes called the Ceylon gooseberry. Seeds of the plant were imported into Hawaii by the Hawaiian Sugar Planters' Experiment Station from the Harvard Botanical Garden in Cuba in 1920. Plants from these seeds have since been widely distributed throughout the Islands. It is a hardy plant and grows in a variety of soils and locations.

NUTRITIVE VALUE. Nothing is known of the nutritive value of the ketambilla except that it is an excellent source of ascorbic acid with about twice the value of that found in oranges.

SUPPLY. Ketambilla are not marketed commercially but may be found in many Hawaii gardens.

USE. The fruit contains sufficient acid and pectin to make a good jelly but it is too strong flavored to use without dilution or combination with other fruits. When diluted, it is necessary to add commercial pectin to make a satisfactory jelly or jam.

* See fig. 8, p. 70.

KETAMBILLA JUICE

YIELD: 4 cups

4 cups ketambilla (1 ½ pounds)
1 ½ cups water

Wash ketambilla and crush in bottom of kettle. Add 1½ cups water, bring to the boiling point, and simmer for 10 to 15 minutes, or until tender. For a clear juice turn into jelly bag and allow juice to drain, shifting pulp occasionally to keep juice flowing. For a pulpy juice the ketambilla may be put through a sieve or fine colander.

SPICED KETAMBILLA JELLY

YIELD: 4 cups

2 cups ketambilla juice
3 ½ cups sugar
1 teaspoon ground cloves
2 teaspoons ground cinnamon
1 teaspoon nutmeg
¼ cup liquid commercial pectin

Prepare juice as directed in Ketambilla Juice recipe. Bring fruit juice to boiling. Mix spices with the sugar and add to boiling juice. Bring to a rolling boil and boil hard 1 minute, stirring constantly. Remove from heat and stir in commercial pectin. Skim and pour into sterilized glasses. Seal with paraffin.

KETAMBILLA-PAPAYA JAM

YIELD: 3 cups

2 cups pulpy ketambilla juice
2 cups ripe papaya pulp
4 cups sugar
3 tablespoons lemon juice
Grated rind of ½ lemon

Prepare pulpy juice as directed in Ketambilla Juice recipe. Measure, combine with papaya pulp, and bring to the boiling point. Add sugar and boil rapidly until mixture sheets from a spoon. Add lemon juice and rind, and pour into sterilized glasses. Seal with paraffin.

KETAMBILLA-GUAVA JELLY

YIELD: 4 cups

2 cups pulpy ketambilla juice
2 cups guava juice
4 cups sugar

Prepare pulpy juice as directed in Ketambilla Juice recipe. Measure, add guava juice, and bring to boiling point. Boil rapidly 5 minutes, skim, then add sugar, stirring until dissolved. Boil rapidly until jelly sheets from the spoon. Pour into sterilized glasses and seal with paraffin.

KETAMBILLA AND APPLE BUTTER

YIELD: 4 to 5 cups

2 cups chopped apples
2 cups crushed ketambilla
1 cup water
¾ cup sugar for each cup cooked fruit pulp

Combine ketambilla, apples, and water and bring to the boiling point. Simmer until ketambilla and apples are tender. Force through a coarse sieve or vegetable ricer. Measure and add ¾ cup sugar for each cup of fruit pulp. Bring to the boiling point and cook rapidly until mixture sheets from the spoon. Pour into sterilized glasses and seal with paraffin.

WHITE-FLESHED JAVA PLUM AND KETAMBILLA JELLY See page 54

LEMON

DESCRIPTION. Several kinds of lemons *(Citrus limonia)*, varying greatly in size and appearance, are grown in Hawaii. One of the larger varieties, 4 to 6 inches long, has a thick, warty, greenish-yellow rind. The flavor of the fruit is strongly acid but pleasant. Common commercial varieties are grown only to a limited extent.

HISTORY. The lemon, a native of southern Asia, is now grown in many warm sections of the world. Lemon plants are said to have been introduced into Hawaii early in the nineteenth century.

NUTRITIVE VALUE. The small quantities of lemons and limes used in the average diet make their nutritive value of minor importance. Both yield an alkaline ash in the body because their high acidity is due to citric acid and basic salts of citric acid. Both fruits are good antiscorbutics, but lemons are superior to limes.

SUPPLY. The lemon season is the same as that of the orange—October, November, and December. Although lemons are produced in small quantities during most of the year, there is usually a period of 1 or 2 months in the spring when they are not obtainable.

USE. The juice of the lemon, used alone or in combination with other fruit juice, makes a very refreshing iced drink. It is combined and served with a great many other foods in order to improve their flavor.

LIME

DESCRIPTION. The acid lime *(Citrus aurantifolia)* is a small citrus fruit of characteristic flavor. Several varieties are grown successfully in Hawaii. The common type of lime is a small, round or oval fruit about 1½ to 2¼ inches in diameter. Its thin skin varies in color from light yellow to green. The flesh, yellow-green and very juicy, contains large quantities of citric acid.

LIME

HISTORY. Like the lemon, the acid lime is a native of southern Asia, from where it has spread to many tropical and subtropical sections of the world. The lime has flourished in Hawaii since its introduction during the early part of the nineteenth century. It seems the most adaptable of the citrus fruits to Island conditions.

NUTRITIVE VALUE. See Lemon (p. 56).

SUPPLY. Limes are nearly always in season, the heaviest crop coming in the late summer and fall. The supply usually equals the demand.

USE. Lime juice is very refreshing and makes a pleasant addition to punch or other iced drinks. It may be substituted for lemon in any recipe, but only two thirds as much should be used because of its higher acidity. Lime sirup may be prepared and kept for future use.

FRESH LIMEADE

YIELD: 6 servings

7 tablespoons lime juice (9 limes)
1 1/3 cups sugar
5 1/4 cups water

Make a sirup by boiling the sugar with 1 cup of water. Cool and add the lime juice and remaining water. Serve with cracked ice.

LIME SIRUP

YIELD: 2 1/2 cups

1 cup lime juice (2 dozen small limes)
2 cups sugar
1/2 cup water

Wash, dry, and squeeze the limes. Boil the sugar and water for 10 minutes. Add lime juice, pour into hot sterile jars, and seal immediately.

To dilute for limeade use 2 tablespoons of sirup to 1 cup of water. Serve with cracked ice.

LIME SAUCE FOR PUDDINGS

YIELD: 1 cup

1 tablespoon cornstarch
1/2 cup sugar
1/4 cup cold water
3/4 cup boiling water
2 tablespoons butter or butter substitute
2 1/2 tablespoons lime juice

Combine sugar and cornstarch and make a smooth paste with cold water. Gradually stir into boiling water. Continue stirring until mixture thickens. Remove from fire and add butter and lime juice. Serve hot or cold.

LITCHI

DESCRIPTION. The litchi *(Litchi chinensis)** is a small, oval or ovate fruit about 1½ inches in diameter. In most varieties, the outer shell-like covering is red and the flesh surrounding the single brown seed is white. The seed varies considerably in size. Seedless fruits have been grown. The fruit is produced and marketed in clusters of 3 to 20 or more. The sweet and slightly acid flavor of the fresh litchi reminds many people of that of the Muscat grape. (The dried fruits, known as litchi nuts, are very different from the fresh. They bear somewhat the same relation to the fresh fruit as raisins do to fresh grapes.)

HISTORY. The litchi, a native of South China, has been cultivated there for many centuries. From China it has spread gradually to many other tropical and subtropical countries. The first litchi tree to be brought into Hawaii is believed to have been planted on the property of C. Afong in 1873. This tree has usually borne abundantly. Within recent years, many other trees throughout the Territory have come into bearing.

NUTRITIVE VALUE. Of the two varieties of fresh litchis analyzed in this series, the Kwai Mi has nearly twice the sugar content (20.6 percent) of the Hak Ip variety, which has 11.8 percent sugar. The Kwai Mi, though a smaller fruit with a larger percentage of refuse, is considered superior in flavor and quality.

Both varieties are poor sources of calcium and good sources of phosphorus. The Kwai Mi variety was found to be a fair source of iron and the Hak Ip a poor source. Litchis are devoid of vitamin A since they contain no yellow pigments. They are a poor source of thiamine and a good source of ascorbic acid.

SUPPLY. The season for the litchi is short, usually a part of June and the early part of July. Small quantities of litchis reach the Honolulu markets, Chinese stores, and fancy grocers. The supply on the retail market never meets the demand; consequently, litchis command a high price per pound. Because the litchi is highly prized by the Orientals, canned fruit as well as dried litchis are imported from China.

USE. Litchis are most frequently served fresh and eaten out of the shell, but shelled fresh litchis make a pleasing addition to a fruit cocktail or fruit salad. The fruit may be successfully canned at home in a medium sirup. Canned litchis may be served alone or in combination with other fruits for dessert, fruit cocktail or salad, or may be used in a sauce served with fried fish or shellfish, Chinese style.

LITCHI, PINEAPPLE, AND ORANGE COCKTAIL

YIELD: 6 servings

2 cups seeded fresh litchis, cut into halves or quarters
2 cups diced fresh pineapple
2 cups diced orange sections
2 tablespoons sugar
1 tablespoon lemon juice

* See fig. 9, p. 71.

Cut the fruit into pieces of uniform size and save the juice. Add the sugar and lemon juice to the other fruit juice. Pour over the diced fruit and chill for 1 hour before serving.

This fruit mixture may be used for a salad if the drained fruit is chilled and combined with the sugar and lemon juice just before the salad is to be served. Serve with 1/3 cup mayonnaise or French dressing.

LITCHI, PAPAYA, AND PINEAPPLE SALAD

YIELD: 6 servings

2 cups seeded fresh litchis, cut into halves
2 cups diced papaya
1/3 cup mayonnaise
2 cups diced fresh pineapple
2 teaspoons lemon juice

Combine the fruit and add the lemon juice. Chill thoroughly. Add the mayonnaise, mix, and serve on lettuce leaves.

LITCHI AND COTTAGE CHEESE SALAD

YIELD: 6 servings

36 large seeded litchis
3/4 cup cottage cheese
1/2 cup mayonnaise
1/3 cup shelled pecans

When shelling and removing the seeds from the litchis, loosen the fruit from the seed at the stem end and cut lengthwise; this procedure leaves the fruit as nearly whole as possible.

Stuff the cavity with cottage cheese. Chill and place on lettuce leaves. Garnish with mayonnaise and pecans.

CANNED LITCHIS

See page 123

MANGO

DESCRIPTION. Many recognized varieties of mangoes *(Mangifera indica)** as well as unnamed hybrids are grown in Hawaii. In general, the mango can be described as a medium-sized fruit from 2 to 4 inches in width and from 3 to 7 inches in length. The skin, which is smooth and thick, is strong enough to be pulled from the flesh when the fruit is ripe or nearly so. In most varieties, as the fruit matures the green skin changes to more brilliant colors—purplish-red shading to green, deep crimson, or even yellow with red spots. The flesh varies in color from light lemon to deep apricot. In the most prized varieties it is juicy, smooth, and free from fiber, and it separates easily from the large hairy seed. The flavor, which varies greatly, may be insipid and sweet or reminiscent of turpentine; however, in the better varieties it is delicious, reminding many people of the flavor of good peaches.

* See fig. 10, p. 72.

HISTORY. Indigenous to southern Asia, the mango is now grown in many subtropical sections of the world. T. G. Thrum stated in the Hawaiian Annual for 1909 that the first mango trees were brought to Hawaii from Manila in 1824 by Captain John Meek of the brig *Kamehameha.* The small trees were divided between the Reverend Joseph Goodrich and Don Marin. These trees were the source of the mangoes known as the Hawaiian race. Joseph Marsden in 1885 imported from Jamaica several seedling mango trees, including the famous No. 9 which is still growing in the grounds of the government nursery on King Street. G. P. Wilder and S. M. Damon also brought in several good varieties; and the Hawaii Agricultural Experiment Station, through the United States Department of Agriculture, Bureau of Plant Industry, introduced a number of varieties from foreign countries. Additional information about the mango may be obtained from Mango Culture in Hawaii, Hawaii Agricultural Experiment Station Bulletin 58.

NUTRITIVE VALUE. Mangoes have a high sugar content, but they are a poor source of calcium, phosphorus, and iron.

Only one variety of mango, the Pirie, has been tested for vitamin A and thiamine. It was found to be a good source of vitamin A and a fair source of thiamine.

More than a hundred tests have been made to determine the ascorbic acid content of different varieties of mangoes, raw and cooked, and of the cooked products subjected to various treatments. Different varieties of mangoes vary greatly in their ascorbic acid content. The highest values have been found for a common type, the *Manini,* and a long slender fruit usually called the Cigar mango—145 and 150 milligrams per 100 grams, in the half-ripe stage and 114 and 119 milligrams in the ripe stage, respectively. Through several seasons, samples of ripe Pirie mangoes have shown low values for ascorbic acid—14 to 16 milligrams per 100 grams. Other varieties showed intermediate values.

All varieties tested contained more ascorbic acid in the green stage, than in the half-ripe stage and more in the half-ripe stage than in the ripe stage.

Mango sauce made from half-ripe mangoes, especially of the common types, is a good to excellent source of ascorbic acid. The ascorbic acid was not destroyed as a result of cooking the mangoes with or without sugar and was well retained in the cooked product stored for a week in the refrigerator. This was true even when the product was sieved and a good deal of air was thus incorporated. A longer period of storage without canning is not recommended.

SUPPLY. Very few mangoes reach the commercial market—usually only those of high quality, such as Pirie and Haden. Because the supply of these superior mangoes is never equal to the demand, they command a high price. Roadside vendors sell a fairly large quantity, but their offerings are often of poor quality. Mangoes usually begin to ripen in April and are available until September or October.

USE. The mango is used fresh as a dessert fruit or in combination with citrus fruits, pineapple, or papaya. It is delicious in fruit cocktails, salads,

shortcake, and frozen desserts. Many people prefer the flavor of green or half-ripe mangoes, which may be used in pies or cooked and served as a sauce. Many children eat mangoes when they are green, hard, and very sour. Mango slices and mango sauce may be canned for future use. Mango chutney is a favorite method of preserving, although mangoes also make delicious jams and marmalades.

MANGOADE

YIELD: 6 servings

⅓ cup sugar
3 cups water
Grated rind ¼ orange
½ cup lemon juice
1 ½ cups ripe mango pulp pressed through sieve
1 cup orange juice

Combine sugar, water, and orange rind and bring to the boiling point. Cool. Add mango pulp and fruit juice and chill. Pour the mixture over cracked ice before serving.

MANGO JAM

YIELD: 1 quart

12 cups half-ripe or ripe mango slices
4 cups water
6 cups sugar

Add water to mango slices and cook about 15 minutes or until tender. Press the mixture through a sieve, add sugar, and boil until thick and of proper consistency for a jam. Pour into hot sterile jars and seal with paraffin.

MANGO-PAPAYA JAM

YIELD: 2 quarts

8 cups peeled mango slices
4 cups water
8 cups papaya slices
8 cups sugar

Cook mango slices in 2½ cups water until tender. Press through a coarse strainer. Cook the papaya in the remaining water until soft. Combine papaya and mango, add sugar, and cook slowly until of proper consistency for jam. Pack in hot sterile jars and seal with paraffin.

MANGO BUTTER

YIELD: 2 quarts

12 cups peeled half-ripe mango slices
3 cups water
6 cups sugar
½ teaspoon ground cloves
½ teaspoon ground allspice
1 teaspoon ground cinnamon
1 teaspoon ground nutmeg

Add water to mangoes and cook until soft enough to mash. Press through a sieve if the mangoes are stringy. Add sugar and spices. Cook slowly for 45 minutes or until thick. Stir frequently to prevent burning. Pour into hot sterile glasses and seal with paraffin.

MANGO CHUTNEY I

YIELD: 4 quarts

2⅓ cups vinegar
6½ cups sugar
12 cups green mango slices
½ cup chopped green ginger root
4 finely chopped chili peppers (with seeds removed)
1 clove of garlic
3 cups seedless raisins
1 large onion, sliced
1 teaspoon salt

Boil vinegar and sugar 5 minutes. Add mangoes and other ingredients and cook about ½ hour or until thick and of the desired consistency. Pour into hot sterile glasses and seal immediately.

MANGO CHUTNEY II

YIELD: 8 quarts

10 pounds peeled, sliced green mangoes
5 pounds sugar
3 to 4 cups vinegar (depending on acidity of mangoes)
3 cups water
1 tablespoon salt
1 ½ pounds almonds, blanched and cut in thin strips
1 pound finely sliced candied orange peel
1 pound finely sliced candied lemon peel
2 large onions, chopped fine
2 pounds seedless raisins
1 pound finely sliced citron
⅔ cup green ginger root, cooked and chopped fine (6 ounces)
1 cup finely chopped preserved ginger
2 finely chopped cloves of garlic
8 small finely chopped red peppers (with seeds removed)

Boil the sugar, salt, water, and vinegar 5 minutes. Add the sliced mangoes and cook until tender. Add the other ingredients and cook slowly for ½ to 1 hour or until the desired consistency is obtained. Pour into hot sterile jars and seal immediately. Serve with meat or curried dishes.

SPICED MANGO PICKLE*

YIELD: 3 pints

1 ½ cups white vinegar
1 ½ cups water
3 cups sugar
5 sticks cinnamon, or ½ teaspoon ground cinnamon
1 tablespoon whole cloves
¼ teaspoon mace
1 teaspoon chopped fresh ginger root
¼ teaspoon nutmeg
3 pounds peeled, sliced green mangoes (2 large slices from each of 17 mangoes)

Combine all ingredients except mangoes, and boil sirup for 5 minutes. Add mango slices and cook until tender and clear, 30 to 45 minutes. Pack mangoes into hot sterilized jars. Add sirup and seal.

If mangoes are sour, add ¼ to ½ cup more sugar to the sirup.

* Contributed by the Home Service Department of The Hawaiian Electric Company, Honolulu.

CANNED MANGO SLICES and SAUCE

See page 124

MANGO SAUCE

YIELD: 1 quart

6 cups green or half-ripe mango slices
1 ½ cups water
1 ½ cups to 2 cups sugar

Cook mangoes in water until they are soft. Add sugar and cook 5 minutes longer. Serve with meat or as a dessert. Mango sauce may be used for a shortcake filling or in sherbets, ice creams, or mousses.

Note: For canned Mango Sauce recipe see canning section, page 124.

MANGO-FRUIT JELLY

YIELD: 6 servings

1 ⅔ tablespoons gelatin
⅓ cup water
⅔ cup boiling water
1/16 teaspoon salt
1 teaspoon finely chopped green ginger root
1 cup sweetened half-ripe mango sauce (see preceding recipe)
1 ½ tablespoons lemon or 1 tablespoon lime juice
¼ cup pineapple juice
1 cup ripe papaya cubes
1 cup shredded canned pineapple

Soak gelatin in cold water, add boiling water, and stir until dissolved. Add salt, ginger, and cool. Combine with mango sauce and fruit juices. Chill until mixture begins to congeal. Stir in papaya and pineapple. Pour into mold, and chill until stiff. Serve as a dessert or with lettuce and mayonnaise as a salad.

BAKED CUSTARD WITH SLICED MANGOES

YIELD: 6 servings

2 cups milk
¼ cup sugar
⅛ teaspoon salt
2 eggs
¼ teaspoon vanilla
1 cup sliced ripe mangoes

Heat milk to the simmering point and add sugar and salt. Beat eggs just enough to mix well and slowly add to hot milk. Add vanilla. Place mango slices in bottom of custard cups or baking dish and pour custard over them. Set dishes in a pan of water and bake in a slow oven (300° F.) for 1 hour. To test, insert a knife blade, and if it comes out clean, remove custard from oven. Cool and serve.

MANGO BROWN BETTY

YIELD: 6 servings

2 cups half-ripe mango slices, firmly packed in cup
3 tablespoons butter
⅔ cup bread crumbs
¾ cup brown sugar
1 teaspoon cinnamon
3 tablespoons water, unless mangoes are very watery

FIGURE 2.—Fruit and foliage of the breadfruit *(Artocarpus communis)*. **⅕ natural size.**

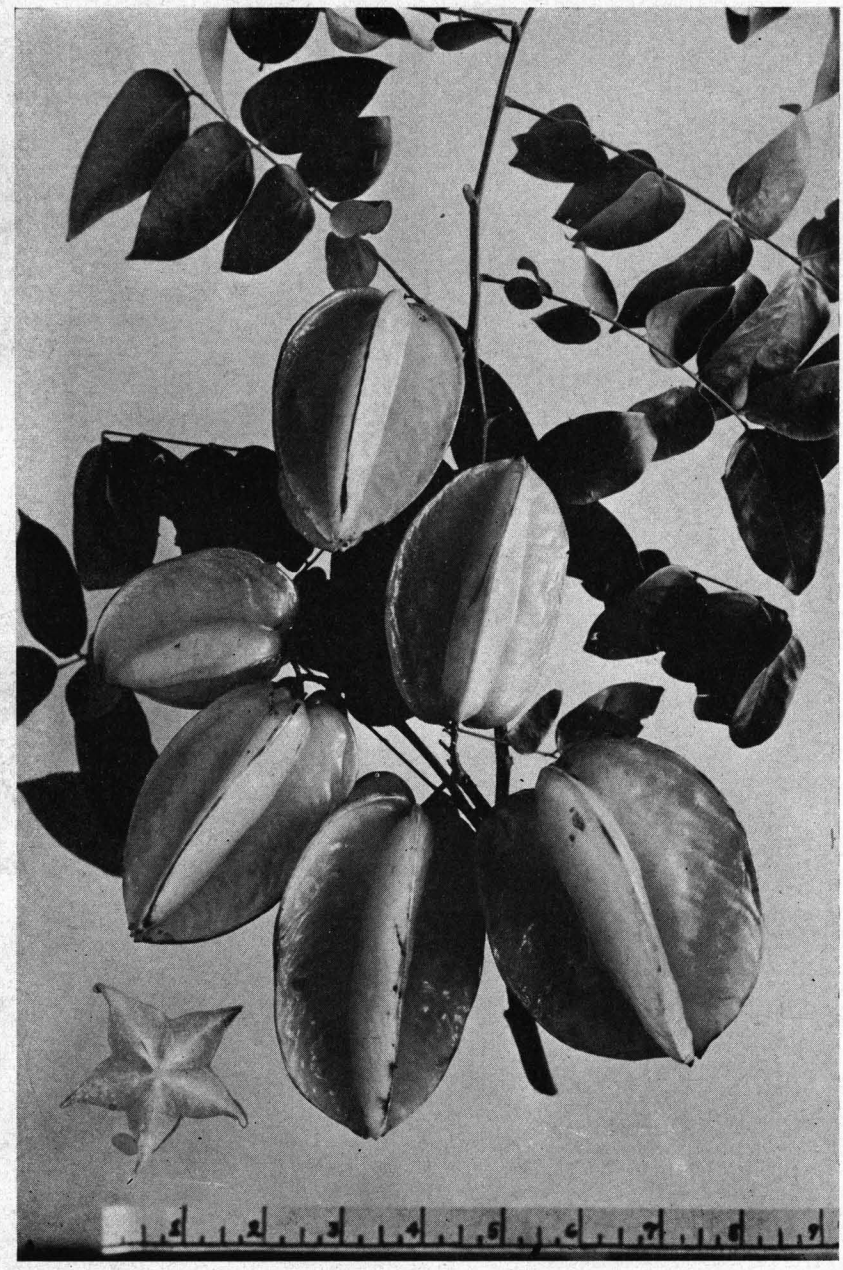


FIGURE 3.—Fruit, foliage, and cross section of the carambola *(Averrhoa carambola)*. 3/8 natural size.

FIGURE 4.—Fruit, foliage, flower, and cross section of the carissa *(Carissa grandiflora)*.

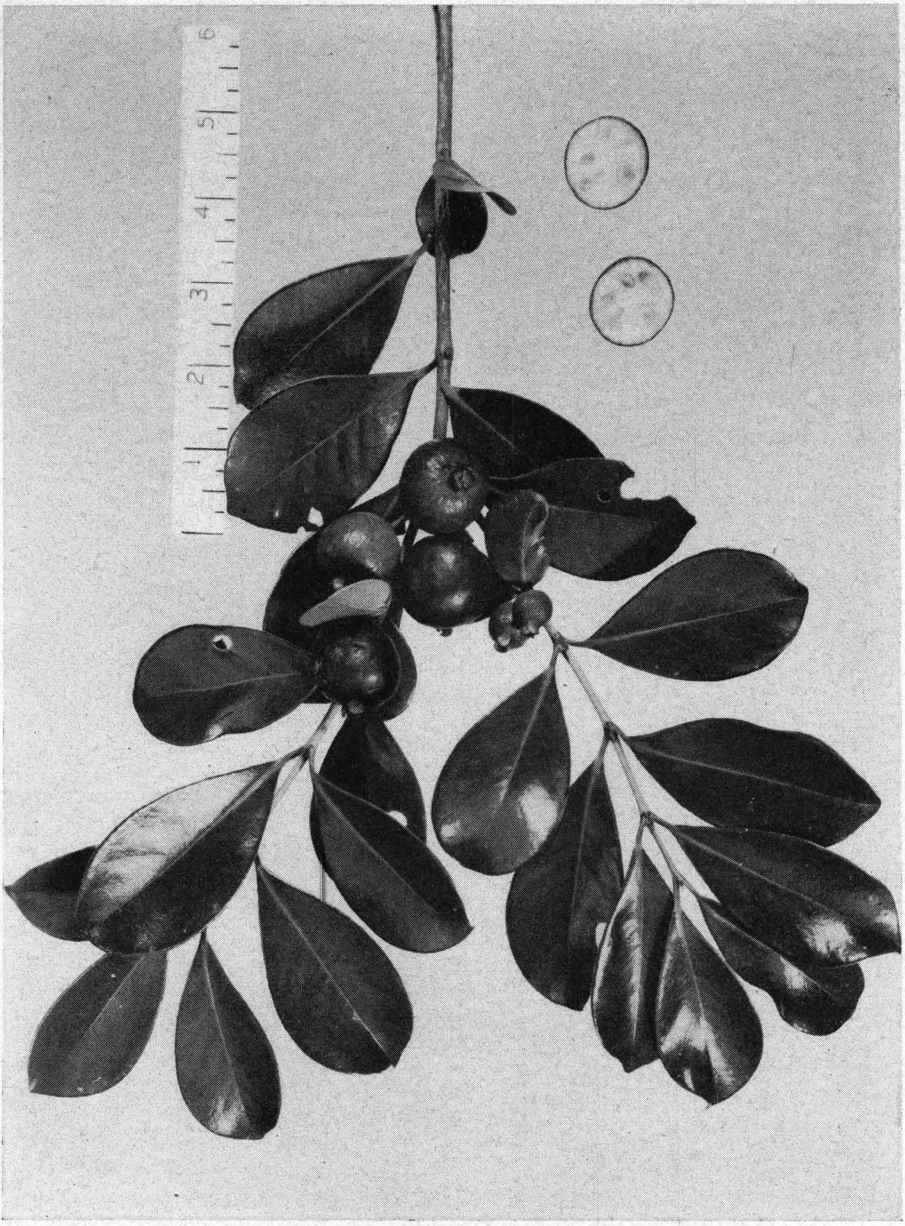


FIGURE 5.—Fruit, foliage, and cross section of the Cattley guava *(Psidium littorale)*.

FIGURE 6.—Fruit and foliage of the common guava *(Psidium guajava)*. 3/8 natural size.

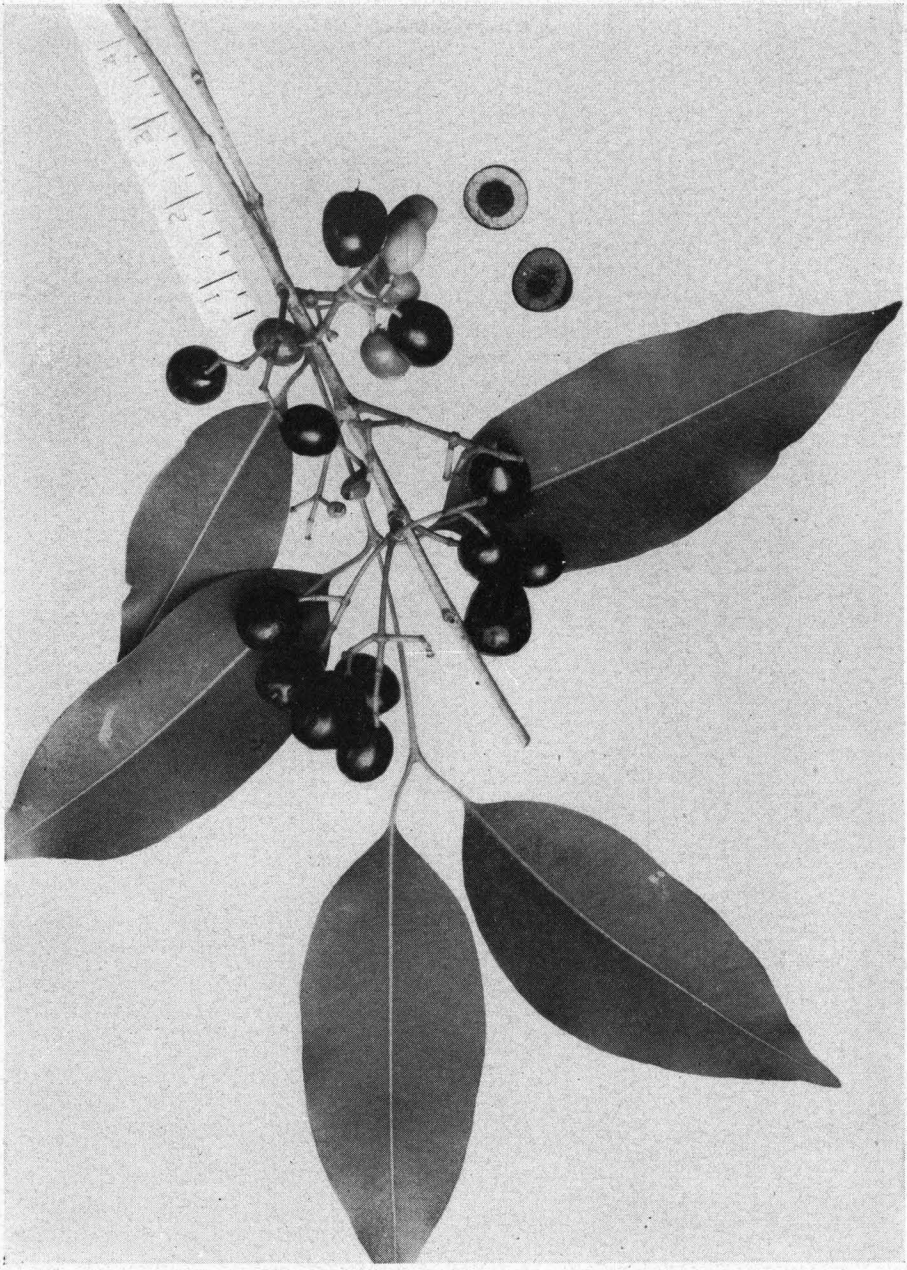


FIGURE 7.—Fruit, foliage, and cross section of the Java plum *(Eugenia cumini)*.

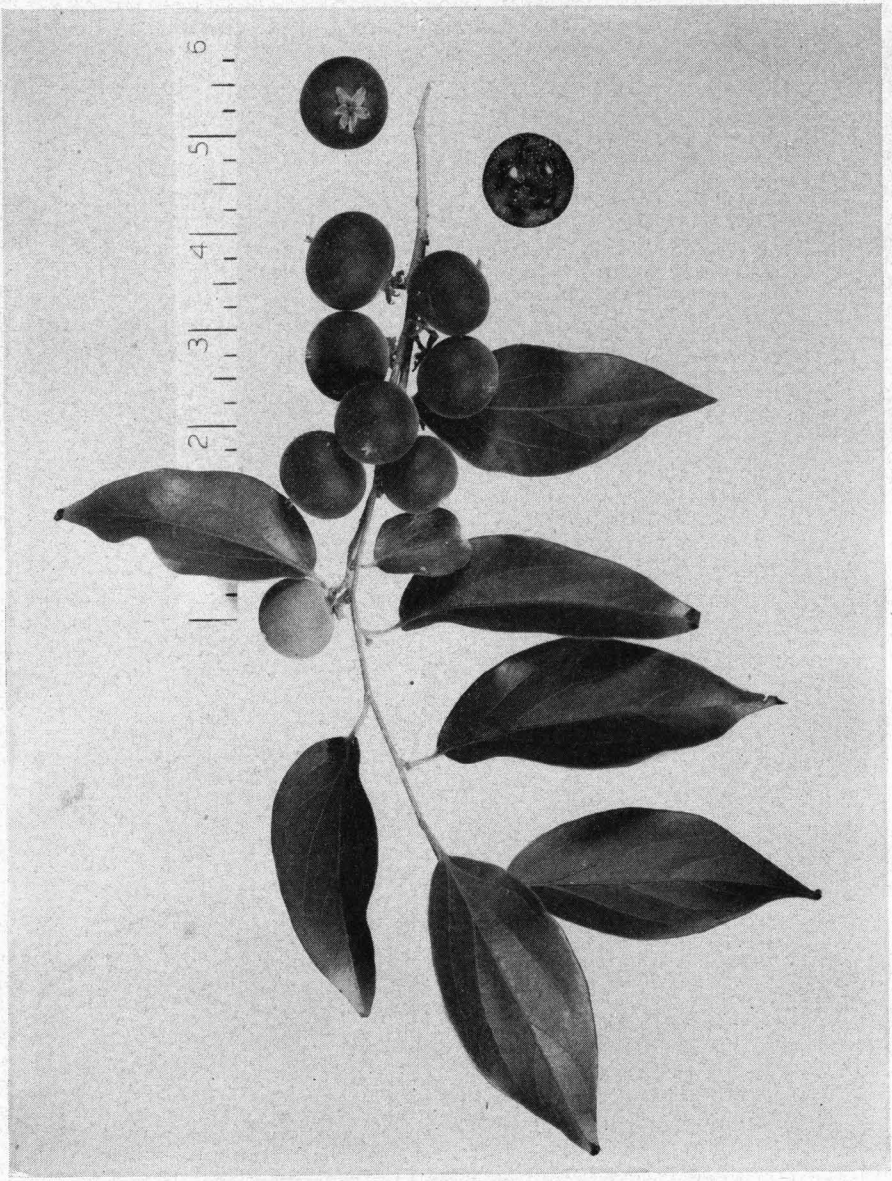


FIGURE 8.—Fruit, foliage, and cross section of the ketambilla *(Dovyalis hebecarpa)*.

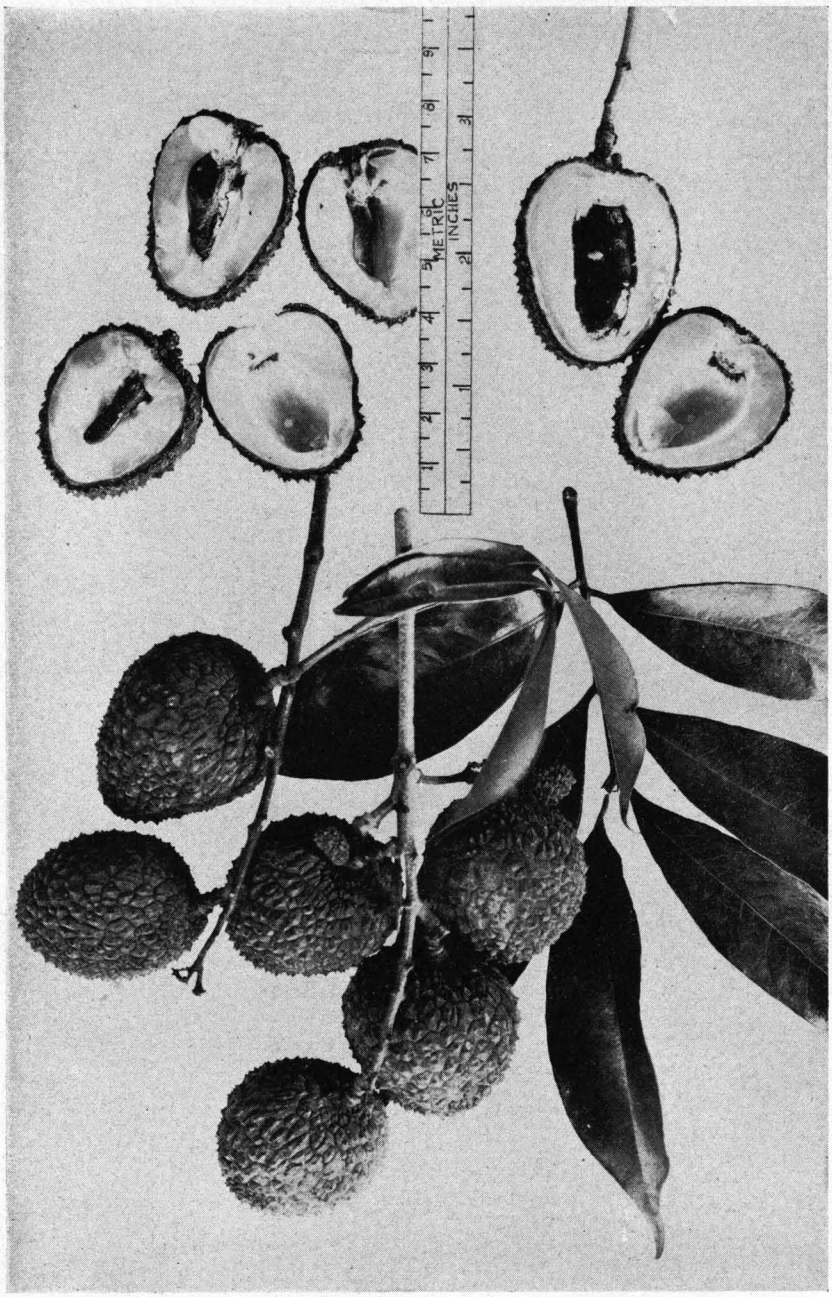


FIGURE 9.—Fruit, foliage, and cross section of litchi *(Litchi chinensis)*. ¾ natural size.

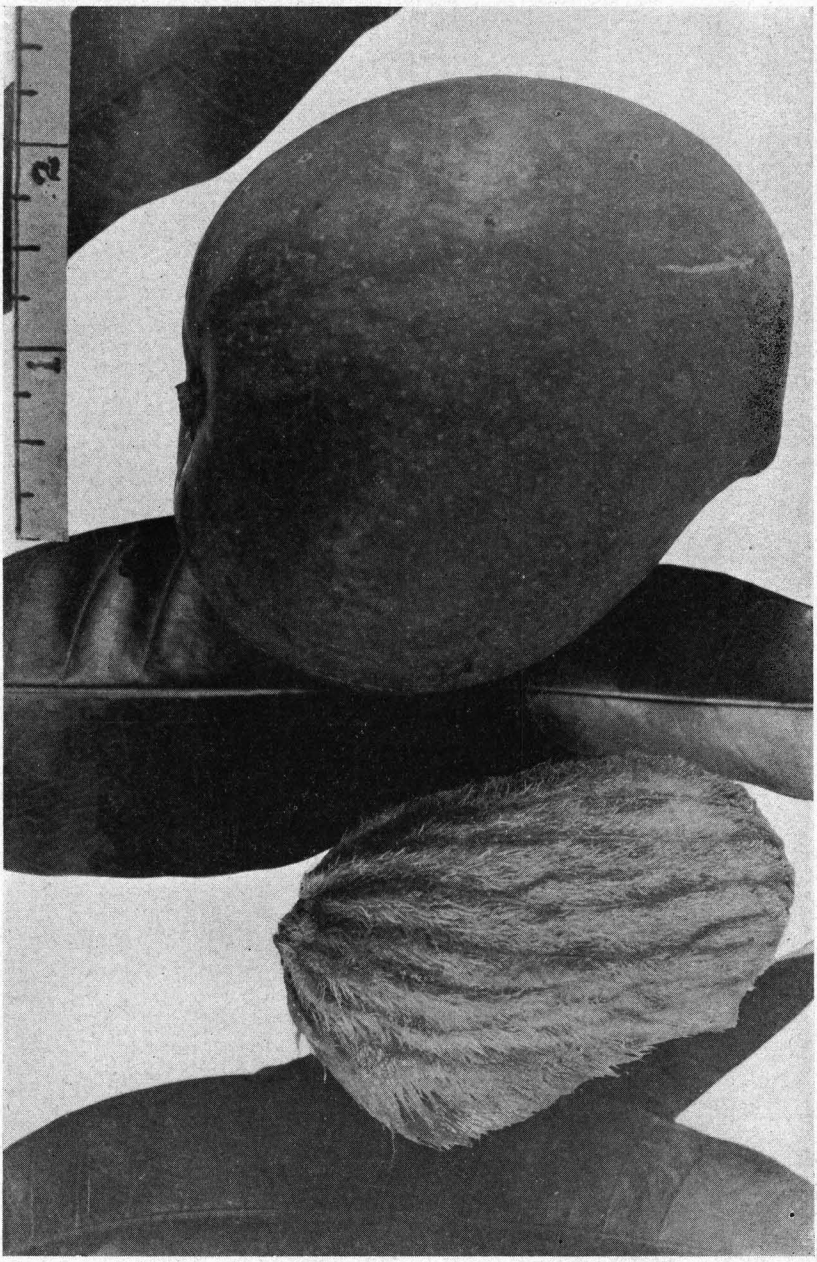


FIGURE 10.—Fruit, foliage, and seed of the Pirie mango *(Mangifera indica)*. Natural size.

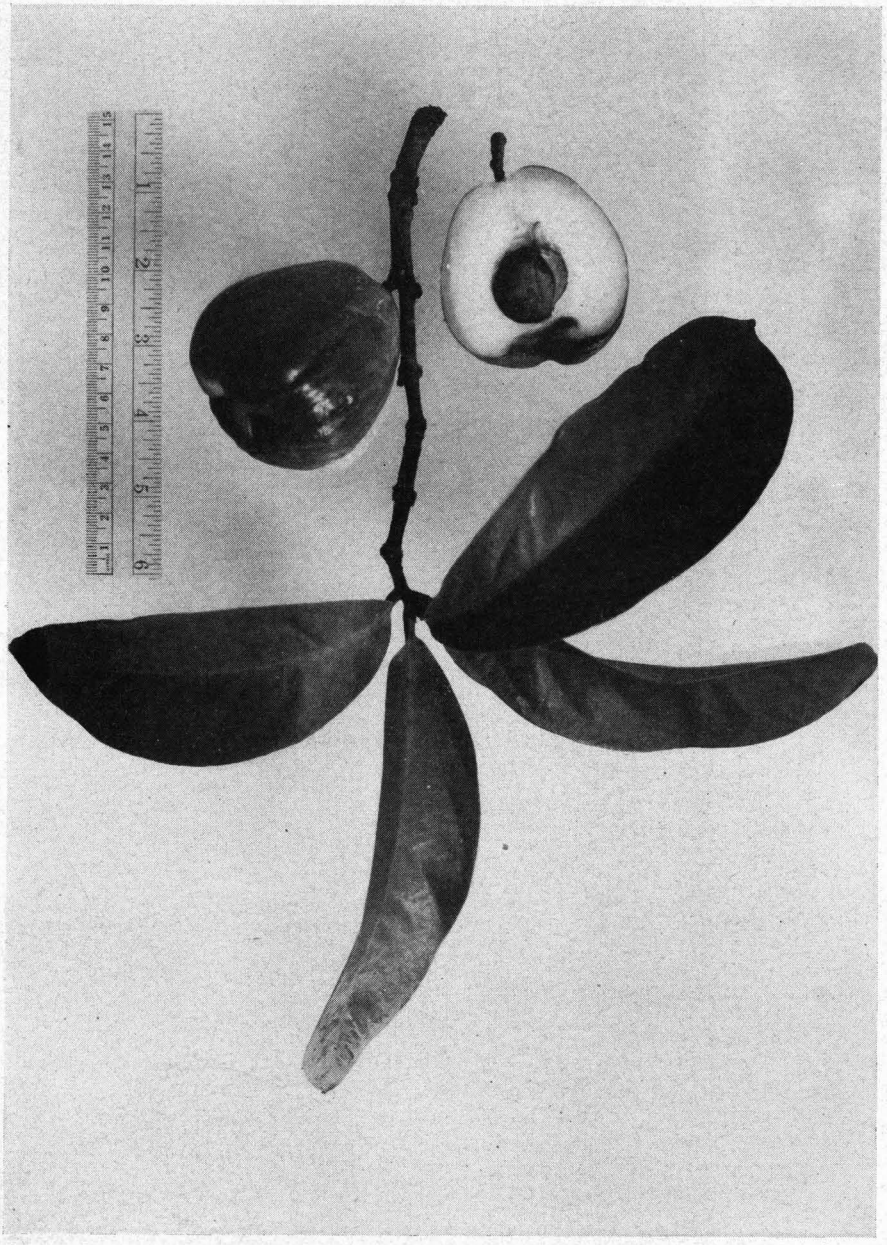


FIGURE 11.—Fruit, foliage, and cross section of the mountain apple *(Eugenia malaccensis)*.

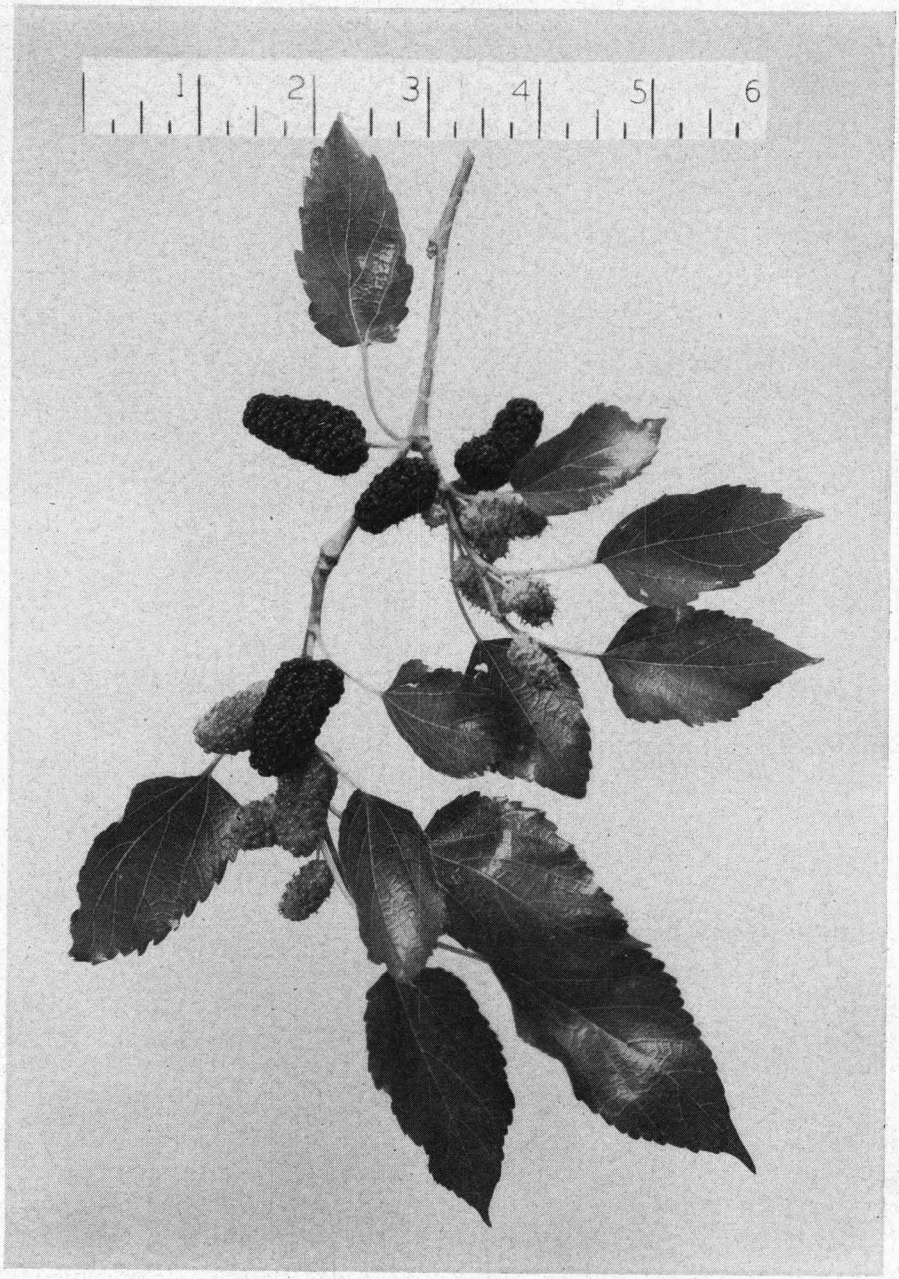


FIGURE 12.—Fruit and foliage of the black seedless mulberry *(Morus nigra)*.

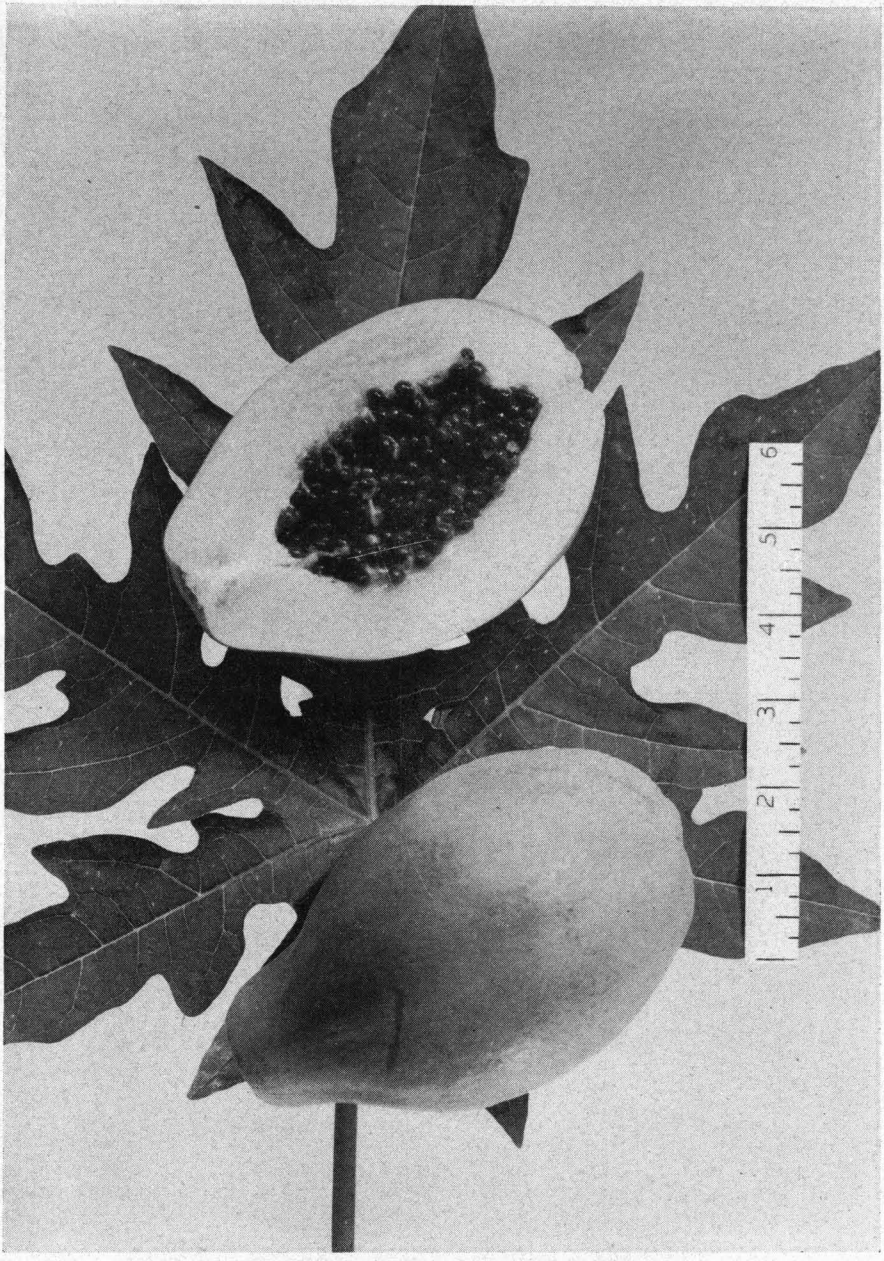


FIGURE 13.—Fruit, foliage, and cross section of the Solo papaya *(Carica papaya)*.

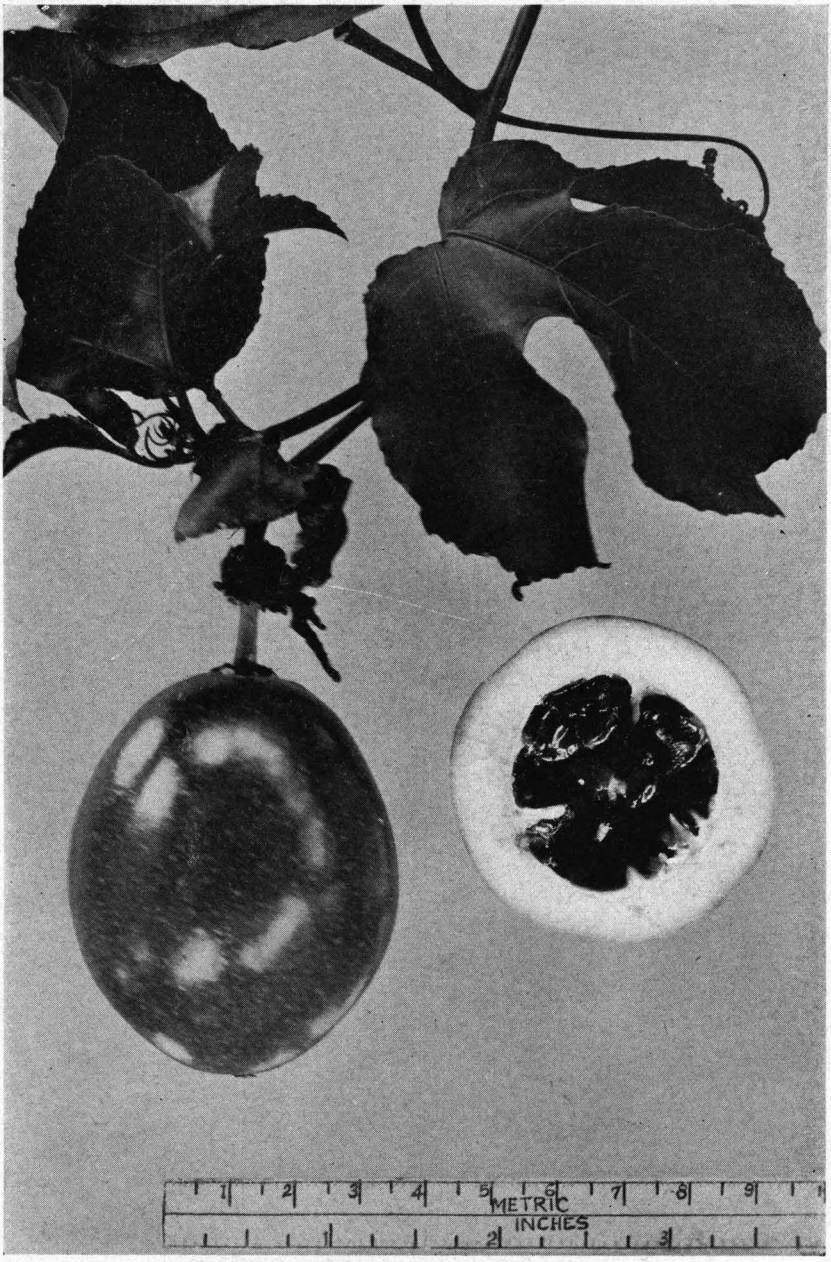


FIGURE 14.—Fruit, foliage, and cross section of the yellow passion fruit *(Passiflora edulis* var. *flavicarpa)*. 7/8 natural size.

FIGURE 15.—Fruit, foliage, flower, and cross section of the poha *(Physalis peruviana)*.

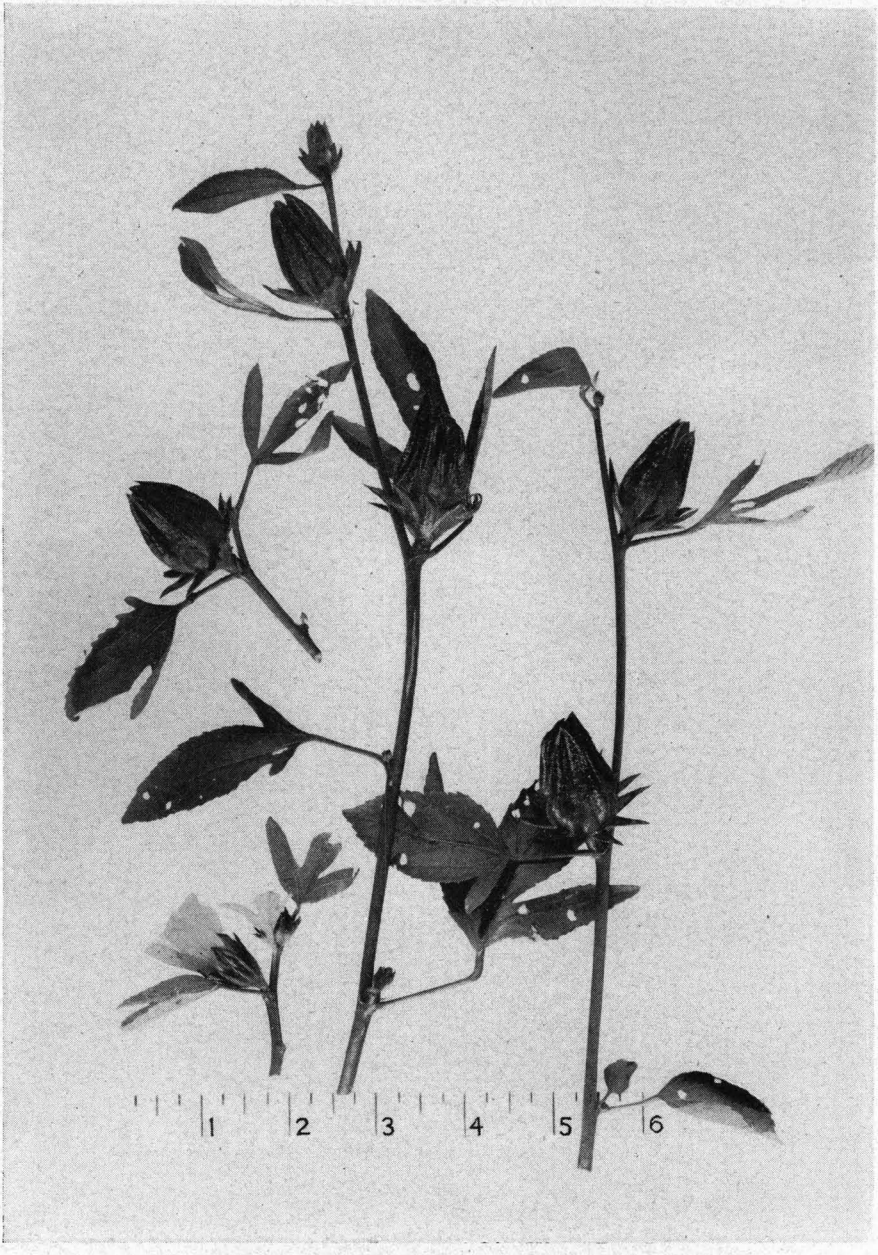


FIGURE 16.—Fruit, foliage, and flower of the roselle *(Hibiscus sabdariffa)*.

FIGURE 17.—Fruit and foliage of the soursop *(Anona muricata)*. ½ natural size.

FIGURE 18.—Fruit and foliage of the Surinam cherry *(Eugenia uniflora)*. 3/8 natural size.

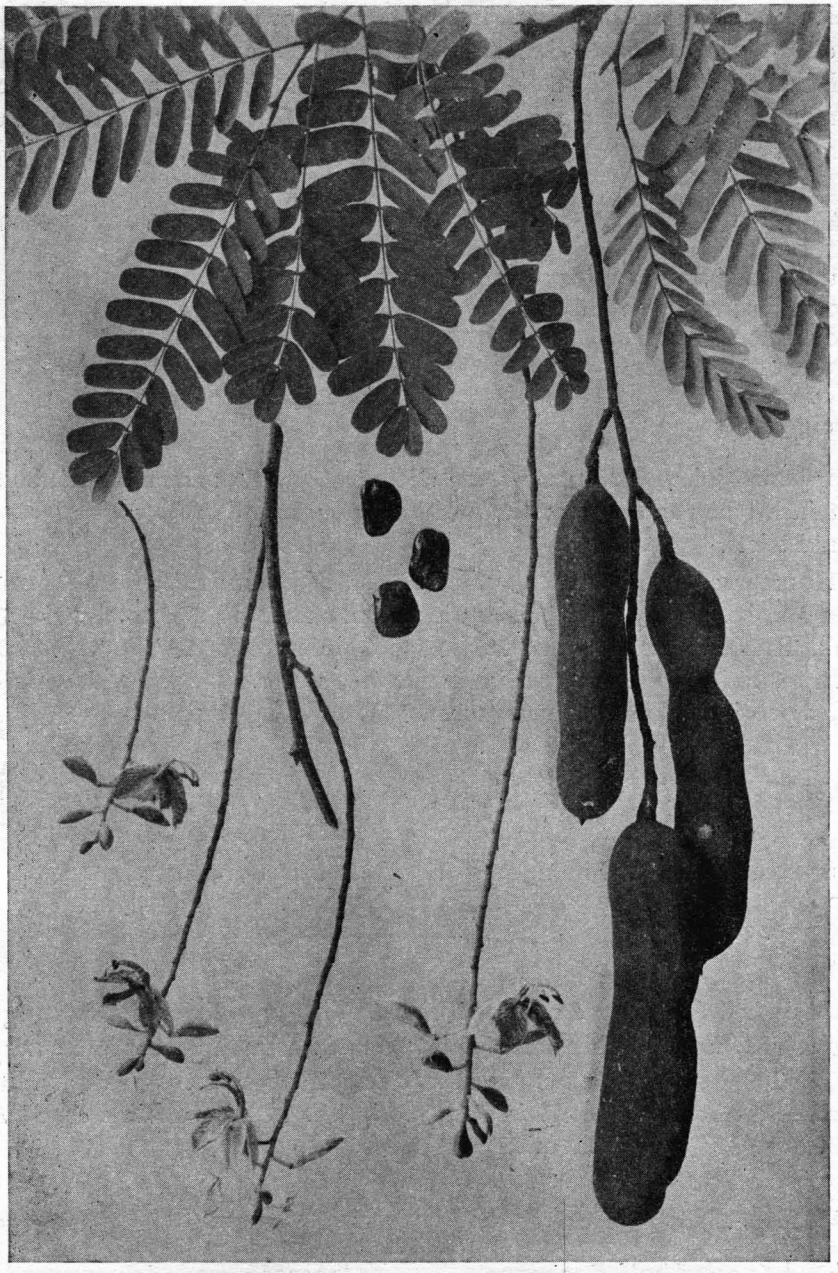


FIGURE 19.—Fruit, foliage, and seed of the tamarind *(Tamarindus indica)*. ½ natural size.

Melt fat and add bread crumbs. Place a layer of the buttered bread crumbs in an oiled baking dish and add a layer of mango. Sprinkle the fruit with sugar and cinnamon and add another layer of crumbs, then of mangoes. Place crumbs on top. Bake in moderate oven (350° F.) about 1 hour, or until mangoes are soft.

MANGO UPSIDE-DOWN CAKE

YIELD: 6 servings

2 cups sliced ripe mangoes
2 tablespoons lemon juice
1 tablespoon butter
⅓ cup brown sugar
¼ cup fat
¾ cup sugar
1 egg
½ cup milk
1 ¼ cups flour
2 teaspoons baking powder
¼ teaspoon salt

Pour lemon juice over mangoes and allow to stand 15 minutes. Melt butter in 8-inch cake pan or casserole. Add brown sugar and cover with a layer of mango slices.

To prepare the cake batter, cream the fat, add sugar and cream together, then add beaten egg. Sift the dry ingredients and add alternately with the milk. Pour over mangoes and bake 50 to 60 minutes at 375° F. When cake is done turn it out upside down and serve while still warm. Serve with whipped cream or a lemon or lime sauce (see p. 57).

MANGO-PAPAYA PIE

YIELD: 4 to 6 servings

1 cup cooked ripe papaya pulp
1 cup cooked half-ripe mango pulp
1 egg yolk
1 cup sugar
1 teaspoon cinnamon
¼ teaspoon nutmeg
2 egg whites
2 tablespoons sugar

Mash cooked fruit or press through sieve. Add egg yolk, spices, and sugar. Cook slowly until the mixture thickens. When it is cool, pour it into a baked pie shell and cover with meringue made of stiffly beaten egg whites and the 2 tablespoons sugar. (See Plain Pastry recipe, p. 16.) Brown in a slow oven (300° to 325° F.) for 20 minutes.

MANGO PIE

YIELD: 4 to 6 servings

3 ½ cups peeled half-ripe mango slices
1 cup sugar
½ teaspoon ground cinnamon
¼ teaspoon ground nutmeg
1 tablespoon lemon juice
2 to 3 tablespoons flour (if desired)

Line a pie pan with pastry. (See Plain Pastry recipe, p. 16.) Put in a layer of mango slices, sprinkle with sugar, flour, and spices, and cover with another layer of mangoes, sugar, flour, and spices. Add lemon juice, cover with pastry, and bake in a hot oven (425° F.) for 10 minutes. Then bake from 30 to 40 minutes in a moderate oven (350° F.) or until mango slices are soft.

Variation: Substitute 1 cup of ripe papaya slices for 1 cup of the mangoes, and double the quantity of lemon juice used.

MANGO CHIFFON PIE*

YIELD: 5 to 6 servings

⅔ cup sweetened green mango sauce (see Mango Sauce recipe p. 63)
4 eggs
¾ cup sugar
1 tablespoon gelatin
¼ cup cold water
1 teaspoon lemon juice
½ teaspoon salt
1 baked 9-inch pie shell (see p. 16)
½ cup sweetened whipped cream

Press the mango sauce through a sieve. Beat the egg yolks slightly, add the mango sauce and ¼ cup sugar. Cook the mixture over hot water until it thickens. Add the gelatin, which has been soaked in ¼ cup cold water. Stir until the gelatin is dissolved, remove from the fire, add the lemon juice, and cool. Add the salt to the egg whites, beat until they are stiff, then beat in ½ cup sugar. When the gelatin mixture begins to thicken, fold in the egg whites, and pour into the pie shell. Place the pie in the refrigerator to chill. Before serving spread the top with sweetened whipped cream.

MANGO SHERBET

YIELD: 1½ quarts

2½ cups sugar
¾ cup water
2 cups thick, unsweetened green mango sauce (see Mango Sauce recipe p. 63)
⅓ to ½ cup lemon or lime juice
3 cups milk
1 egg white

Dissolve sugar in water by bringing to the boiling point. Cool the sirup and add it to the fruit and milk. Add the unbeaten egg white. Pour into freezing container and freeze, using 8 parts of ice to 1 part of ice-cream salt. The mixture may curdle, but this does not affect the finished product.

For freezing in a mechanical refrigerator, dissolve 2 cups sugar in water and combine with fruit and milk. Pour into freezing tray and freeze quickly. When partially frozen, beat egg white until stiff, add ½ cup sugar and beat until sugar is dissolved. Fold into mango mixture and continue stirring every half hour until frozen.

* BAZORE, KATHERINE. HAWAIIAN AND PACIFIC FOODS. New York. 1940.

MANGO-PAPAYA MOUSSE

YIELD: 6 servings

1 cup ripe papaya pulp
1 cup half-ripe mango pulp
6 tablespoon sugar
2 tablespoons lemon juice
½ cup evaporated milk

Peel papaya and mangoes and press through a sieve. Add the sugar and lemon juice. Set aside until the sugar is dissolved. Chill evaporated milk by surrounding with ice or placing in freezing pan of mechanical refrigerator until small crystals appear around the sides. Pour into a chilled bowl and whip until stiff. Fold in the mango-papaya mixture. Pour into a refrigerator pan and freeze 4 to 6 hours or into mold and pack in 3 parts of ice and 1 part of ice-cream salt. Seal mold with a strip of cloth dipped in hot paraffin or fat.

MANGO MOUSSE

YIELD: 6 to 8 servings

½ tablespoon gelatin
2 tablespoons cold water
¾ cup sugar
½ cup hot water
1/16 teaspoon salt
1 cup half-ripe mango sauce (unsweetened)
1 tablespoon lime or 1 ⅓ tablespoons lemon juice
1 ½ cups whipping cream

Soak gelatin in cold water. Combine sugar and hot water, bring to boiling point, and stir until sugar is dissolved. Cool, add mango, salt, and fruit juice. Freeze until it is the consistency of mush, then fold in cream which has been whipped. Freeze in mechanical refrigerator tray from 4 to 6 hours or in a mold packed in 3 parts of ice and 1 part of ice-cream salt.

Sweetened mango pulp may be used and sugar reduced to 3 tablespoons.

MOUNTAIN APPLE

DESCRIPTION. The mountain apple *(Eugenia malaccensis),** called *ohia ai* by the Hawaiians, is an oval fruit from 2 to 3 inches long. It has a very thin crimson skin shading to pink or white. The crisp white flesh is juicy and of pleasant, though not distinctive, flavor. Each fruit contains one or two large brown seeds. The fruit is easily bruised and stains the hands deep purple.

HISTORY. This fruit, a native of the Malayan Archipelago, was brought to Hawaii by the primitive Hawaiians. It flourishes in the deep mountain valleys of all the Islands.

NUTRITIVE VALUE. Mountain apples are a poor source of calcium and phosphorus and a fair source of iron. They are a poor source of vitamin A, and thiamine, and a fair source of ascorbic acid.

* See fig. 11, p. 73.

SUPPLY. The season ranges from June to December. The fruit is brought down from the mountains and sold along the roadside. Only small quantities reach the city markets.

USE. The mountain apple is very refreshing to eat because of its juiciness and delicate flavor. It is most frequently eaten out of the hand, but may be used in salads and fruit cocktails. The fruit does not contain enough pectin or flavor to make it desirable for jelly or preserves, but it makes a delicious sweet pickle.

SWEET PICKLED MOUNTAIN APPLES

YIELD: 1½ pints

2½ pounds ripe mountain apples
2¼ cups sugar
1 cup vinegar
1 cup water
1 teaspoon whole cloves
1½ sticks cinnamon broken into ½-inch lengths
1-inch piece of fresh ginger root, crushed

Wash apples, cut in halves or quarters, core, remove blossom ends and blemishes. Do not remove skin. Tie spices loosely in a piece of cheesecloth. Add to sugar, vinegar, and water, and boil for 5 minutes. Add apples and cook until apples are tender. Allow them to stand in the sirup overnight. In the morning drain off the sirup and bring to a boil. Pour the sirup over apples and repeat for three consecutive mornings. Retain spices until desired flavor is obtained. On the third morning, drain sirup from apples and remove spice bag. Pack apples in hot sterilized jars. Bring the sirup to the boiling point and pour over apples making sure to completely fill the jars. Seal.

If a less highly spiced product is desired, use less spice and add it at the last cooking period. Pickles may be finished in one cooking period by continuing the cooking until apples are clear and translucent.

The flavor is improved if the pickles are allowed to stand for a month or two before using.

BLACK MULBERRY

DESCRIPTION. The black mulberry *(Morus nigra),** a native of Persia and the Caucasus, is a small fruit that varies greatly in size but rarely exceeds an inch and a quarter in length and a half inch in diameter. Perhaps due to lack of cross pollination, it often appears in Hawaii in a seedless form, which may become a permanent variety. The seedless type is an excellent, well-flavored, subacid fruit that should be more widely cultivated.

* See fig. 12, p. 74.

Mulberry trees will grow to a height of 20 to 30 feet in Hawaii but for fruit production they may be trimmed to the size of a small tree or even a shrub and used as a hedge. The best quality fruit is produced when the tree is well trimmed and well watered.

HISTORY. W. Hillebrand states that the first mulberry trees were brought to the Islands in connection with projects for silk culture. This was probably many years before 1870, because in his Flora of the Hawaiian Islands he stated that the trees had become naturalized in various parts of the Islands. There have been introductions from the Mainland and the Orient from time to time. In recent years many of the old trees have been cut down.

NUTRITIVE VALUE. Analyses made elsewhere show that mulberries contain approximately 10 percent of sugars. A black seedless variety grown in Honolulu was found to be a poor source of ascorbic acid.

SUPPLY. Mulberries are not marketed commercially, probably because they are a delicate fruit easily bruised and difficult to handle. However, they are a good home garden fruit; this is especially true of the seedless variety.

USE. Mulberries may be eaten fresh with sugar and cream. They make excellent pie, cobbler, and sherbets. Even those with seeds make a good fruit juice for spiced drinks. Mulberries are best combined with other fruits for jam.

SPICED MULBERRY JUICE

YIELD: 1 quart

4 cups berries
4 cups water
2 whole allspice
2 whole cloves
1 3-inch stick cinnamon

Wash berries and crush. Add water and spices and bring to a boil. Simmer 10 minutes. Strain. Add sugar and boil 5 minutes more. Serve hot.

MULBERRY PRESERVES

YIELD: 1½ pints

2 cups crushed mulberries
1 cup crushed pineapple
2 cups crushed papaya
Sugar (⅔ cup for each cup cooked fruit)

Boil the fruits together for 10 minutes or until soft. Measure the fruit and add ⅔ cup of sugar for each cup of fruit. Bring to the boiling point and cook, stirring to prevent burning, until jam is thick—about 35 minutes. Pour into sterilized glasses and seal with paraffin.

MULBERRY JAM

YIELD: 3 cups

2 pounds mulberries (8 cups)
Sugar (¾ cup for each cup cooked berries)
3 to 4 tablespoons lemon juice
Grated rind of ½ lemon

Wash berries and partially crush them in large kettle. Heat slowly until juice flows freely, then boil rapidly until about half of the juice is evaporated. Measure cooked berries and add ¾ cup sugar for each cup of berries. Boil rapidly to jelly-like consistency. Stir frequently to prevent scorching. Add lemon juice and rind. Pour into sterilized glasses and seal with paraffin.

MULBERRY PIE

YIELD: 1 two-crust 9-inch pie

3 cups mulberries
1 cup sugar
3 tablespoons flour
¼ teaspoon salt
1 tablespoon lemon juice (if desired)
1 recipe pastry (see p. 16)

Line a pie tin with plain pastry. Fill with berries mixed with sugar, flour, and salt. Add lemon juice, if used. Cover with top crust. Bake in hot oven, 450° F. for 10 minutes. Reduce heat to 350° F. and continue baking approximately 30 minutes longer, or until brown.

MULBERRY COBBLER

YIELD: 6 servings

1 cup sifted enriched flour
½ cup whole-wheat flour
3 teaspoons baking powder
½ teaspoon salt
½ cup sugar
¼ cup enriched margarine
⅓ cup milk
3 cups mulberries
1 cup sugar
1 tablespoon lemon juice
1 tablespoon quick-cooking tapioca

Sift dry ingredients. Cut in the enriched margarine. Beat egg and combine with the milk, then add to the dry ingredients, stirring only until all the flour is slightly dampened. Mix together washed berries, sugar, tapioca, and lemon juice, and pour into an oiled casserole. Drop batter in mounds on mulberries. Bake in hot oven 450° F. for 10 minutes, then reduce heat to 350° F. and continue baking for approximately 30 minutes longer.

MULBERRY ICE

YIELD: 8 to 10 servings

2 cups fresh mulberries
¾ cup sugar
½ cup water
Pinch of salt
1 to 2 tablespoons lemon juice
4 tablespoons orange juice
2 egg whites

Wash berries and crush them in bottom of kettle. Add sugar and cook slowly for 5 minutes. Add water and press through a sieve. Cool, add salt, egg whites, lemon and orange juice, and freeze in ice-cream freezer. Allow 1 part salt to 8 parts of ice. Mulberry ice is excellent to serve with a meat course.

MULBERRY SHERBET YIELD: 1 pint

20 marshmallows
1 cup mulberry juice
4 tablespoons orange juice
2 tablespoons lemon juice
1 tablespoon sugar
2 egg whites

Place marshmallows and mulberry juice in double boiler and cook, stirring frequently, until thoroughly melted. Remove, cool, and add orange and lemon juices. Pour into the refrigerator tray and chill until partly jellied. Whip egg whites until stiff and add sugar. Fold into the jellied mulberry mixture and mix very thoroughly. Freeze.

HAWAIIAN ORANGE

DESCRIPTION. Although several varieties of oranges *(Citrus aurantiacum* var. *sinensis)* have been introduced into Hawaii, only the seedling known as the Hawaiian is grown commercially. The Hawaiian orange is a medium-sized, round variety. The yellow skin is thin and rather tough. The flesh is commonly yellow-orange and very juicy. It varies from acid to sweet but is usually rather mild in flavor. Additional information about the orange and other citrus fruits may be obtained from Citrus Culture in Hawaii, Hawaii Agricultural Experiment Station Bulletin 71.

HISTORY. The Hawaiian variety of orange has been developed by a long period of cultivation. One of the original orange trees left in Hawaii by Captain Vancouver in 1792 still lives. He gave the natives a number of small orange seedlings, some of which were planted on a piece of land belonging to a prominent Hawaiian at Kealakekua in the district of Kona. In time, the land which had come into the possession of the famous high chiefess, Kapiolani, was obtained by an early missionary, the Reverend J. D. Paris, who began his residence there about 1852. At that time his daughter, Ella Paris, was four years old. In 1936 she still occupied a part of the old Paris home and clearly recalled that the old tree was one of several which in her youth were very old.

At one time the orange, one of the first fruits to be cultivated commercially in Hawaii, was the leading export from the district of Kona on the island of Hawaii. The districts of Waialua, on Oahu, and Waimea, on Kauai, were also well-known for their oranges. Kona, Waialua, and Waimea oranges are named for these districts, but all are of the same variety.

NUTRITIVE VALUE. The nutritive value of oranges has been extolled by so many scientists in recent years that little need be added here.

Though acid to the taste, oranges leave an alkaline ash residue in the body and tend, like most other fruits, to make the urine more alkaline.

Analyses of Hawaiian oranges show them to have a chemical composition similar to that of oranges grown on the Mainland. Average analyses show oranges to be superior to most fruits as sources of calcium and equal to or better than other fruits as sources of phosphorus and iron. Our analyses show that the calcium contents of the orange with the membrane surrounding the sections is almost twice that of the orange with the membrane removed, but the phosphorus and iron content is about the same in each case. We found the juice of Hawaiian oranges to contain 0.010 to 0.013 percent of calcium and the juice of California navel oranges prepared in the same manner to contain 0.015 percent of calcium. The juice for analysis was passed through a copper sieve of 10 meshes to the inch, a size comparable to household orange juice strainers on the market.

It is highly probable that the calcium content of oranges and orange juice may be affected by a number of factors such as variety, soil, and fertilizer. Our analyses would indicate that the quantity of membranous material included in the juice is also an important factor.

Hawaiian-grown oranges are a poor source of vitamin A, a fair source of thiamine, and an excellent source of ascorbic acid. The values for 13 samples of orange juice ranged from 53 to 76 milligrams ascorbic acid per 100 cubic centimeters, with an average of 65 milligrams.

If allowed to stand, juice made from Hawaiian oranges, like that made from oranges grown elsewhere, develops a bitter flavor. The cause of this bitter taste has been investigated by Traub and co-workers in Florida. They concluded that the bitter taste which develops in prepared citrus juices is due to the glucosides contained in certain portions of the fruit, especially the white inner peel and the membranes surrounding the sections. They also concluded that enzymes of the fruit were not concerned in the development of the bitter flavor. Their experiments showed that the bitter flavor of the juices tended to decrease with the maturity of the fruit used and were in harmony with the fact that the glucoside content of citrus fruits decreases with maturity.

SUPPLY. Hawaiian oranges are grown principally in the Kona region on Hawaii. The demand for them has not been great because of the quality and appearance of the oranges and because very little grading has been done for the market. Hawaiian oranges are in season during October, November, and December.

USE. The well-ripened and mature Hawaiian orange may be used in the same ways as mainland oranges. Marmalade made from Hawaiian oranges is usually more bitter than that made from California oranges. If the membranes and inner pulp of the peel have a bitter flavor, soak the peel in water and discard the water. Then cook the peel in fresh water. This will remove the bitterness and make a more palatable marmalade.

TART ORANGE MARMALADE

YIELD: 1 ¼ quarts

2 Hawaiian oranges
2 Hawaiian lemons
3 cups water to 1 cup fruit
1 cup sugar to 1 cup fruit and water

Remove rind and soak it overnight. Discard water next morning and cook the rind in a large quantity of water 30 minutes. Cool and scrape out the white pulp. Cut peeling into very fine strips. Cut fruit into fine pieces. Measure the fruit pulp and add three times as much water. Allow to stand overnight. In the morning measure the fruit pulp and water and add the same amount of sugar. Then add the cooked peelings. Cook the mixture until it gives a slight jelly test. Pour into hot sterile glasses and seal with paraffin.

TART AMBER MARMALADE

YIELD: 1 ½ quarts

2 Hawaiian oranges
2 Hawaiian lemons
½ grapefruit or pomelo
6 cups water
1 cup orange juice
½ cup lemon juice
¾ cup sugar to 1 cup fruit pulp and liquid

Remove peeling from fruit and scrape out the white pulp. Cut peeling into very fine strips. Cut fruit pulp into very fine pieces. Add peeling and 2 cups of water. Let this stand overnight. In the morning discard water and add 2 cups of fresh water, letting it stand overnight again. On the third day discard the water, replacing it with 2 cups of fresh water. Cook for ½ hour. Add fruit juice. To each cup of fruit and liquid combined add ¾ cup sugar. Cook until it gives a slight jelly test. Pour into hot sterile jars and seal with paraffin.

PAPAYA

DESCRIPTION. The papaya *(Carica papaya)** is a melonlike fruit which varies greatly in size and shape. The Solo papaya is a small fruit from 3 to 5 inches in diameter, but other varieties 20 inches or more in length and weighing 10 pounds may sometimes be seen on the market.

The skin is smooth and thin, shading from deep orange to green. The flesh varies from 1 to 2 inches in thickness and from light yellow to deep salmon pink in color. Numerous round, black, wrinkled seeds, each enclosed in a gelatinous membrane, cling to the inner wall. The flavor and odor of the fruit are distinctive. The white latex that exudes from the leaves, stems, and unripe fruit of papaya is very irritating to the eye.

* See fig. 13, p. 75.

PAPAYA

HISTORY. The date of the introduction of the papaya into Hawaii is uncertain. Because the papaya has a distinctly Hawaiian name, *he-i,* some people insist that it grew in Hawaii before the first European voyagers arrived. However, Dr. Mayen, who visited Hawaii in 1831, stated that while visiting Don Marin's possessions, he learned of the many kinds of plants introduced by Don Marin. Among them was the papaya from the Marquesas Islands. This introduction must have been prior to 1823, as William Ellis noted "pawpaw apples" growing in the gardens in Kona that year.

Pawpaw is the word commonly used in England for the papaya, but in the southern United States, the name is likely to be confused with pawpaw as applied to the *Asimina triloba,* a very different fruit. Most countries now use either the name papaya or some variation of it, as papaia, apaeya, or papaja, which are all believed to be derived from the Carib word *ababai.*

Additional information about the papaya may be obtained from Papaya Culture in Hawaii, Hawaii Agricultural Experiment Station Bulletin 61.

NUTRITIVE VALUE. The quantity of papain, a protein-splitting enzyme, consumed when even large quantities of papaya are eaten is probably not of any great nutritional significance, but it may possibly be the reason that a few people experience some digestive distress after eating papaya. Ripe papaya contains little or no papain.

Papaya is a good source of vitamin A, a poor source of thiamine, and an excellent source of ascorbic acid. Weekly tests over a period of a year have proved that Solo papayas from two localities on the island of Oahu—Poamoho Experimental Farm and Kailua—are excellent sources of ascorbic acid. The ascorbic acid content ranged from 60 to 122 milligrams per 100 grams and averaged 84 milligrams per 100 grams for 85 fruits. As an economical and important source of vitamin A and ascorbic acid, papaya should be more widely used by people in Hawaii.

Stewing and baking papaya were found to destroy 7 to 12 percent of the ascorbic acid originally present. The use of lemon or lime juice, called for in most recipes, would increase the acidity and probably improve the retention of ascorbic acid in the cooked papaya.

Papaya is one of the fruits in which ascorbic acid increases as the fruit ripens. When the skin is dark green and the flesh a light yellow color, the fruit contains 60 to 70 percent as much ascorbic acid as it does when ripe.

SUPPLY. The supply and quality of papayas on the market during the year vary greatly. The quality and flavor of the fruit depend partially on the season and the amount of rainfall. The supply is usually greater than the demand during May, June, and July.

USE. The papaya is preferably used in the ripe stage. However, green papaya may be boiled and served as a vegetable. Ripe papaya is more desirable used fresh. It makes an excellent breakfast or dessert fruit served with lemon or lime. In fruit cocktails or salads it is usually combined with pineapple or the citrus fruits. Fresh papaya pulp with milk or cream makes a delicious

frozen dessert. Papaya alone or combined with other fruits makes excellent jams and marmalades.

PAPAYA-PINEAPPLE NECTAR

YIELD: 5 cups

2 cups diced ripe papaya
2½ cups pineapple juice (No. 2 can)
¼ cup lemon juice or 2⅔ tablespoons lime juice
¼ cup passion fruit juice or 3 tablespoons passion fruit pulp (if desired)
½ cup sugar or ¼ cup sugar and ¼ cup honey

Peel papaya, cut into pieces, and force through a coarse sieve or ricer. Combine with other ingredients and stir until sugar is dissolved. Pour over cracked ice and serve cold.

If electric food liquifier or mixer is used, combine all ingredients and stir in the mixer for 2 minutes.

PAPAYA-BANANA NECTAR

YIELD: 3¾ cups

1 cup mashed papaya
½ cup mashed ripe banana
1 cup canned guava juice (unsweetened)
½ cup sugar
⅔ cup water
2 tablespoons lemon juice

Peel ripe papaya and banana, cut into pieces, and press through a coarse sieve. Combine all the ingredients and stir until thoroughly blended. Pour over cracked ice until chilled and serve.

If electric food liquifier or mixer is used, combine all ingredients and stir in the mixer for 2 minutes.

PAPAYA ONO-ONO

YIELD: 12 cups

4 cups ripe papaya pulp (3 pounds)
1 cup passion fruit juice
¼ cup lemon or lime juice
2½ cups guava juice
½ cup orange juice
4 cups pineapple juice
1 cup sugar
½ cup water

Peel papaya, cut into small pieces, and force through a coarse sieve. Add fruit juices and chill. Boil sugar and water until sugar is dissolved. Chill, add to fruit juice, and chill again. Pour over cracked ice before serving.

Variation: Omit sugar and use ¾ cup passion fruit sirup (see p. 98) instead of the fresh fruit juice.

If electric food liquifier or mixer is used, combine all ingredients and stir in the mixer for 2 minutes.

PAPAYA SHAKE

YIELD: 5 servings

2 cups mashed ripe papaya pulp
⅓ cup lemon or ¼ cup lime juice
⅔ cup sugar
1 ½ cups evaporated milk
1 ½ cups water
1 teaspoon nutmeg

Combine mashed fruit and sugar, then add other ingredients. Chill. Just before serving, shake with cracked ice in a glass jar having tight-fitting lid.

PAPAYA CATSUP

YIELD: 2 quarts

14 cups strained papaya pulp
4 tablespoons whole allspice
3 tablespoons whole cloves
3 tablespoons mustard seed
1 stick cinnamon
1 medium-sized piece of ginger root, chopped
1 large onion, sliced
⅛ teaspoon red pepper
6 tablespoons sugar
2 tablespoons salt
1 ⅓ cups vinegar
¼ teaspoon tartaric acid

Tie the spices and onion in a cheesecloth bag, add to the papaya pulp, and cook slowly for 40 minutes. Add the sugar, salt, vinegar, and tartaric acid crystals. Cook 1 hour, or until thick. Remove bag of spices. Pour catsup into hot sterile jars and seal.

RIPE PAPAYA JAM

YIELD: 1 ½ quarts

6 cups ripe papaya pulp
1 cup lemon juice
6 cups sugar

Peel papayas and press through a coarse sieve. Measure. Add lemon juice and sugar. Boil vigorously for 20 minutes, or until thick enough for jam, stirring frequently to prevent scorching. Pour into sterile jars and seal with paraffin.

PAPAYA MARMALADE

YIELD: 1 ¾ quarts

10 cups sliced firm ripe papaya
1 cup fresh shredded pineapple
½ cup orange juice
½ cup lemon juice
Grated rind of 1 orange and 2 lemons
3 tablespoons grated green ginger root
1 cup sugar to each cup cooked fruit

Combine all ingredients except sugar. Boil for 30 minutes. Measure cooked fruit and add an equal measure of sugar. Cook together for 30 minutes, stirring frequently to prevent burning. When done, pour the mixture into hot sterilized jars and seal with paraffin.

PAPAYA AND GINGER MARMALADE

YIELD: 2 quarts

2 lemons, thinly sliced and cut into halves
1 teaspoon fresh ginger root, chopped fine
4 cups water
4 cups sugar
8 cups sliced firm ripe papaya

Cook lemon in 2 cups of water for 30 minutes, or until it becomes transparent. Boil the ginger, sugar, and 2 cups of water together to make a sirup. Add the sirup to the other ingredients and boil slowly for 30 minutes. Pour into hot sterile glasses and seal with paraffin.

PAPAYA PICKLE

YIELD: 2 quarts

4 cups sugar
2 cups vinegar
12 cloves
16 peppercorns
4 bay leaves
8 cups half-ripe papaya pieces (1 ½ inches long and ½ inch wide)
2 cups water

Make a sirup of sugar and vinegar, add cloves, peppercorns, and bay leaves. Cook papaya slices in the water for 5 minutes and add the drained fruit to the sirup. Cook the mixture 15 minutes. Pour into hot sterile jars and seal immediately.

PAPAYA SAUCE

YIELD: 6 servings

6 cups diced half-ripe or firm ripe papaya
½ cup water
1 cup sugar
¼ cup lemon or 3 tablespoons lime juice

Combine papaya and water. Cook about 15 minutes until papaya is soft. Add sugar and stir until dissolved. Remove from heat and add lemon juice. This sauce may be served with the meat course or as dessert course. It is especially good for papaya shortcake filling. The sauce may be pressed through a coarse strainer if a smoother mixture is desired.

STEWED GREEN PAPAYA

YIELD: 6 servings

6 cups diced green papaya
¾ teaspoon salt
½ cup water
1 tablespoon butter
Dash of pepper

Peel and dice papaya. Boil in salted water until tender. Remove from the heat and add pepper and butter. Serve hot as a vegetable. The cooked papaya may be mashed if preferred.

BAKED PAPAYA

YIELD: 6 servings

2 or 3 firm ripe Solo papayas
2 tablespoons lemon or lime juice
1 tablespoon butter
¾ teaspoon salt

Pare and cut papayas lengthwise into halves or thirds. Remove seeds. Sprinkle with salt, lemon juice, and butter. Place in a baking pan and add enough water to cover the bottom of the pan. Bake in a moderate oven (350° F.) for 35 minutes. Serve immediately. Baked papaya may be used in place of a vegetable.

Half-ripe papaya may be used if preferred.

PAPAYA SALAD

YIELD: 6 servings

4 cups diced papaya
6 teaspoons finely chopped onion
1 cup finely chopped celery or Wong-nga-bok (Chinese cabbage)
1 teaspoon salt
¾ cup cooked salad dressing or mayonnaise

Cut papaya into cubes. Add the chopped vegetables and chill the mixture. Serve on lettuce leaves and garnish with mayonnaise.

ROYAL HAWAIIAN DELIGHT

YIELD: 6 servings

1 cup whipping cream
¼ cup confectioner's sugar
8 marshmallows
½ cup shredded coconut
1 ½ cups ripe papaya cubes
½ cup diced orange
2 teaspoons lemon juice

Chill cream, and whip. Add sugar, then marshmallows cut into quarters. Fold in papaya, lemon juice, orange, and coconut. Pour into serving dish or individual glass dishes. Chill before serving.

PINEAPPLE AND PAPAYA COCKTAIL

YIELD: 6 servings

2 cups diced ripe papaya
2 cups diced pineapple
6 tablespoons lemon juice
2 tablespoons sugar

Mix the ingredients and chill for ½ hour before serving.

PAPAYA SAUCE CAKE

YIELD: 6 servings

1 cup diced ripe papaya
3 tablespoons water
¼ cup fat
1 cup sugar
1 egg
1 ½ teaspoons baking powder
½ teaspoon salt
⅓ teaspoon ground cinnamon
⅓ teaspoon grated nutmeg
¼ teaspoon ground ginger
1 ¼ cups flour
2 teaspoons lemon juice
½ cup seedless raisins (if desired)

Stew the papaya and water together until a soft smooth sauce is obtained; press the mixture through a coarse sieve if necessary. Cream fat. Add sugar and mix well. Add beaten egg. Sift salt, baking powder, spices, and flour together. Add cooled papaya sauce and the dry ingredients alternately to the egg mixture. Fold in lemon juice and raisins. Pour into an oiled loaf-cake pan and bake in a moderate oven (350° F.) for 50 to 60 minutes.

PAPAYA UPSIDE-DOWN CAKE

YIELD: 6 servings

2 cups sliced papaya
2 tablespoons lemon juice
⅓ cup brown sugar
1 tablespoon butter
¼ cup fat
¾ cup sugar
1 egg
1 ¼ cups flour
2 teaspoons baking powder
¼ teaspoon salt
½ cup milk

Pour lemon juice over papaya and allow to stand 15 minutes. Melt the butter and brown sugar in a hot skillet or a shallow pyrex dish. Place a layer of the papaya slices on top of the sugar mixture. To prepare the cake mixture, cream the fat, add ¾ cup sugar and, when well mixed, add the beaten egg. Sift the salt, baking powder, and flour together and add to the egg mixture alternately with the milk. Pour this batter into the skillet and bake in a moderate oven (350° F.) from 50 to 60 minutes. When the cake is done, turn it upside down on a large plate. Serve hot with whipped cream, lime, or lemon sauce (see p. 57).

OAHU PAPAYA PIE

YIELD: 4 to 6 servings

1 tablespoon butter
2 cups strained, thick papaya sauce
2 egg yolks
¼ cup sugar
1 teaspoon ground ginger
1 teaspoon ground cinnamon
¼ teaspoon ground nutmeg
1 teaspoon salt
2 tablespoons lemon juice
1 baked 9-inch pie shell (see p. 16)

Melt butter. Add cooked papaya pulp, egg yolks, sugar, spices, and lemon juice. Pour into a baked pie shell. Bake in a moderate oven (325° F.) for 45 minutes, or until firm.

PAPAYA MILK SHERBET

YIELD: 1 quart

1 ½ cups ripe papaya pulp
3 tablespoons lemon juice
½ cup orange juice
1 ½ cups milk
1 cup sugar

Press papaya pulp through a coarse sieve and add the fruit juice. Dissolve sugar in milk and add the fruit mixture gradually to the milk. Pour into freezing pan of mechanical refrigerator and freeze quickly, stirring every half hour during process.

A superior product may be obtained by freezing in an ice-cream freezer, using 8 parts of ice to 1 part of ice-cream salt.

PAPAYA ICE CREAM

YIELD: 6 servings

Use the recipe for Papaya Milk Sherbet (see p. 96), substituting thin cream or 1 cup thin cream and ½ cup whipping cream for the milk. If the ice cream is frozen in mechanical refrigerator trays, stir several times during the freezing process.

PASSION FRUIT

DESCRIPTION. The passion fruit *(Passiflora edulis)* is a medium-sized oval fruit from 2 to 3 inches long. There are two varieties common in Hawaii, the purple passion fruit *(Passiflora edulis)* and the yellow passion fruit *(Passiflora edulis* var. *flavicarpa)*.* The brittle shell encloses a juicy yellow pulp and many small seeds. Although the shell dries up and becomes wrinkled after the fruit has matured, the pulp remains in good condition for several weeks.

HISTORY. The passion fruit, a native of Brazil, has been carried to all parts of the world. In many places it is grown only as a hothouse plant. Its unusual flowers inspired the Spaniards to name it the passion plant. In Australia, where the purple passion fruit is very popular, it is cultivated on a large scale. In Hawaii, the purple variety is commonly called *Lilikoi* because the first seeds of this variety, which were brought from Australia by Eugene Delemar, were planted in the district of Lilikoi on East Maui. Although both purple and yellow varieties of the *Passiflora edulis* are locally called water lemons, that term is correctly used only for the *Passiflora laurifolia,* which is grown to a limited extent in Hawaii.

NUTRITIVE VALUE. Analyses of the juice of the purple passion fruit showed it to have a high sugar content and low calcium and phosphorus content. It is a fair source of iron.

The passion fruit juice keeps well because of its natural high acidity reported to be due largely to citric acid. The yellow passion fruit is more acid than the purple variety. The acidity of the purple passion fruit juice was found to be 2.3 percent calculated as citric acid, whereas the acidity of the yellow passion fruit juice was 3.9 percent.

* See fig. 14, p. 76.

The juice of the yellow passion fruit, prepared by squeezing the pulp in two thicknesses of cheesecloth, was found to be a fair source of vitamin A and ascorbic acid.

SUPPLY. Passion fruit ripens during the summer and fall. Some ripen as late as January. The fruit is occasionally found in Honolulu markets.

USE. The fruit is prepared for use by cutting it in two and removing the pulp with a spoon. It may be eaten fresh out of the shell or it may be used to flavor candy, cake icing, or frozen desserts. The distinctive flavor of the fruit juice makes it a pleasant addition to iced drinks. Canned passion fruit may be prepared by adding the fresh passion fruit pulp to a boiling hot sirup. If bottled and sealed at once the canned fruit will keep for some months. The sirup loses flavor and changes color if stored more than 6 to 8 months.

PASSION FRUIT AND COCONUT CANDY

YIELD: 60 pieces

½ cup passion fruit pulp
2½ cups dry shredded coconut
5 cups confectioner's sugar
English walnuts (if desired)

Press passion fruit pulp through a coarse sieve in order to remove the seeds. Combine fruit pulp and two-thirds of the sugar. Beat until mixture is creamy. Add one-half of the coconut and sufficient sugar to form a soft ball. Roll balls in coconut and place on a buttered pan. Garnish with nut meats. Allow candy to harden at least 8 hours in a cold place.

PASSION FRUIT SIRUP

YIELD: 2 quarts

4 cups water
6 cups sugar
2⅔ cups passion fruit pulp or
2 cups passion fruit juice
(24 fruit)

Add sugar to water and heat to the boiling point. Press passion fruit pulp through a sieve or squeeze in poi cloth or cheesecloth to remove seeds. Add pulp to the sirup. Pour into hot sterile bottles and seal at once. This sirup keeps well 6 to 8 months. It may be used for iced drinks, cake icings, and frozen desserts.

PASSION FRUITADE

YIELD: 6 servings

2 cups passion fruit sirup
4 cups cold water

Mix, chill, and pour over cracked ice.

FRESH PASSION FRUIT PUNCH

YIELD: 6 servings

1 ⅓ cups fresh passion fruit juice
1 ⅓ cups pineapple juice
1 ⅓ cups water
2 cups sugar
1⅔ tablespoons lemon juice

Press passion fruit pulp through a coarse sieve or squeeze in poi cloth or cheesecloth to obtain juice. Add remaining ingredients and chill. Pour over cracked ice before serving.

HOT SPICED PASSION FRUIT JUICE

YIELD: 5 cups

3¾ cups water
⅞ cup sugar
6 strips lemon peel (⅓-inch wide)
18 whole cloves
18 whole allspice
3 pieces stick cinnamon (2 inches long)
¾ cup passion fruit juice
1½ teaspoons lemon juice

Combine all ingredients except fruit juices. Boil 10 minutes in a covered container, stirring occasionally. Add passion fruit and lemon juice and heat to the simmering point. Strain and serve hot with a strip of lemon peel in each cup.

PASSION FRUIT PUNCH

YIELD: 6 servings

½ cup lemon juice
1⅓ cups passion fruit sirup
⅔ cup orange juice
2⅔ tablespoons sugar
3½ cups water

Mix ingredients. Chill, and pour over cracked ice.

PASSION FRUIT CAKE ICING*

YIELD: 1⅓ cups

3 tablespoons butter
2¼ cups confectioner's sugar
¼ cup fresh passion fruit pulp or 3 tablespoons passion fruit sirup

Press passion fruit pulp through a sieve to remove seeds. Cream butter, adding ⅓ cup of the sugar gradually. Add fruit pulp and remaining sugar. Beat until the mixture is smooth and stiff enough to spread on cake.

PASSION FRUIT SHERBET

YIELD: 6 servings

¼ cup sugar with passion fruit sirup or ½ cup sugar with fresh passion fruit juice
2 cups water
¼ cup fresh passion fruit juice or passion fruit sirup
1 egg white

Combine sugar and water and heat to the boiling point. When the mixture is cool, add passion fruit and unbeaten egg white. Pour into a freezer. Freeze, using 8 parts of ice to 1 part of ice-cream salt.

* Adapted from recipe booklet from Kremer Plantations, Cardiff-By-The-Sea, California.

PASSION FRUIT ICE CREAM

YIELD: 6 servings

¼ cup sugar with passion fruit sirup or ½ cup sugar with fresh passion fruit juice
2 cups thin cream
½ cup passion fruit sirup or fresh passion fruit juice
½ tablespoon vanilla

Mix all ingredients and stir until sugar is dissolved. Freeze in mechanical refrigerator pan, or ice-cream freezer, using 8 parts of ice to 1 part of ice-cream salt.

PASSION FRUIT MOUSSE

YIELD: 6 servings

½ tablespoon gelatin
2 tablespoons cold water
3 tablespoons boiling water
1 ¼ cups passion fruit sirup
1 cup whipping cream

Soak gelatin in cold water. Add boiling water and heat the mixture over hot water until the gelatin is thoroughly dissolved. Chill cream and whip. Fold in sirup and gelatin. Freeze from 4 to 5 hours in a mechanical refrigerator pan or in a tightly sealed mold packed in ice, using 3 parts of ice to 1 part of ice-cream salt. Seal mold by using narrow strip of cheesecloth dipped in melted paraffin or lard.

PINEAPPLE

DESCRIPTION. The pineapple *(Ananas comosus)* is really a collection of small fruits and is called a multiple fruit. In the flower stage the corollas are separate but the ovaries are fused, giving the appearance of a cluster of flowers on a single stalk. The mature pineapple, a large fruit shaped like a pine cone or pyramid, is about 6 to 10 inches in height and weighs 5 to 8 pounds. It grows on a stalk or peduncle that is a continuation of the plant stem of the low cactus-like pineapple plant. The tough and horny rind is composed of small hexagonal sections, fitted together like pieces of tile. Each of these sections marks a botanically individual fruit. The skin of a ripe pineapple may be deep yellow, chocolate-green, or mottled green and brown. The flesh is very juicy and has a somewhat fibrous texture. It varies in color from white to deep yellow. The edible portion surrounds a tough central core which was originally the flower stalk.

HISTORY. The pineapple, a native of South America, early became a favorite luxury of wealthy Europeans. The history of the introduction of the pineapple into Hawaii is not known, but it is generally believed that the fruit was brought in by some Spaniard, who had previously touched the coast of South America.

Although Don Marin records in his diary in 1813 that he had pineapples growing in his garden, they were probably first planted on the island of Hawaii, where they now grow wild. A pineapple similar to the Wild Kailua pineapple also grows in Guam, Formosa, and the Philippine Islands. Some of this half-wild fruit was shipped in the fresh state to San Francisco before 1880, but the fruit spoiled easily and was of poor quality.

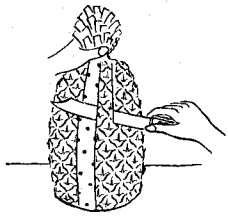
The pineapple industry was of minor importance in Hawaii until 1886, the date of the introduction of the Smooth Cayenne variety. The first pineapple was canned commercially in 1892. From that time on the industry developed until today it is the second largest industry in the Islands.

NUTRITIVE VALUE. The pineapple has long been valued for its distinctive flavor and refreshing qualities.

Fresh ripe pineapple is a good source of sugar and a fair source of calcium. Pineapple juice has more calcium than guava juice or juice from Hawaiian oranges. The phosphorus and iron contents of fresh pineapple and fresh pineapple juice are low in comparison with those of many other fruits in this series.

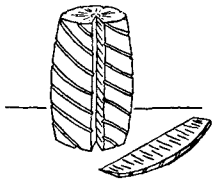
Pineapple of the Smooth Cayenne variety is a poor source of vitamin A, a fair source of thiamine, and a fair to poor source of ascorbic acid. The Pineapple Research Institute is developing new varieties that contain larger quantities of ascorbic acid than the Smooth Cayenne.

Pineapple juice, even when consumed in large quantities, tends to make the urine more alkaline. E. K.

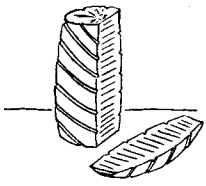


a) Cut the sharp points from the top of a pineapple. Then holding the top firmly in the left hand, with a fairly large heavy knife start peeling strips from the top downward until the entire rind is removed. (The top may be removed before cutting off the rind.)

b) Remove the eyes by cutting diagonal grooves around the pineapple.

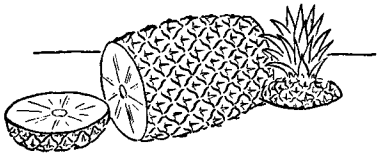


c) Cut off the top and slice the pineapple lengthwise into wedges. Each serving then has some of the sweetest and most desirable portions of the fruit. The core may be removed from each slice.

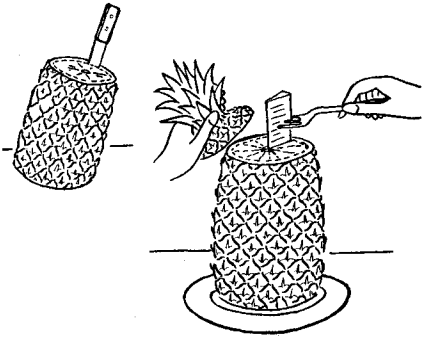


d) If larger slices are desired, cut entirely through the peeled pineapple lengthwise and serve the slice whole.

FIGURE 20*a*.—Methods of preparing fresh pineapple "Family Style."



a) Cut 1½-inch slices from top and bottom of an unpeeled pineapple. Save these pieces. With a long slender knife cut around the fruit ½ inch inside the rind.



b) Loosen fruit at top and bottom and then push it out of the rind in one piece. Cut the peeled fruit into six or eight wedge-shaped pieces. Refill the shell with spears and replace the top and bottom. Serve by removing pineapple top and taking out sections with fork or fingers.

FIGURE 20*b*.—Methods of preparing fresh pineapple "Luau Style."

Nelson has shown that of the nonvolatile acids in pineapple juice, about 87 percent is citric and about 13 percent is *l*-malic.

Some people find that eating large quantities of fresh pineapple causes a soreness of the mouth and the esophagus. It has been suggested that this irritation may result from the combined action of the acid, the protein splitting enzyme (bromelin), and the calcium oxalate crystals.

Pineapple does not increase in sweetness after it is harvested because there is no starch stored in the fruit that will change to sugar. The sugars are formed in the leaves of the pineapple plant and transferred to the fruit. Pineapple is usually sweeter in the summer months when the days are longer and the sunshine more abundant.

SUPPLY. Though the greater portion of the crop is used for canning, excellent pineapples are to be found in the Honolulu markets during the entire year. The fruit is most plentiful during June, July, and August, but a second and smaller crop ripens during December and January.

SELECTION. Several factors should be considered in the selection of a pineapple. Color and size alone are not always dependable guides.

A yellow rind is not necessarily an indication of a good ripe pineapple. Many pineapples reach the market having what dealers call a chocolate-green color, or mottled green and brown. These fruits may be in prime condition.

If the crown is small and compact, the fruit is likely to be well developed, while a pineapple with the crown as long or longer than the fruit is not likely to be of first quality.

Pulling leaves from the crown is not a dependable test. The best one is to snap the side of the fruit with the thumb and finger. If the result is a hollow thud, the fruit is sour, not well matured, and lacking in juice. If a dull solid sound results from the snap, it indicates a well-ripened, sound fruit, full of juice. Some experience may be necessary to distinguish between good and inferior fruit by this method, but the sound test is the most dependable guide for choosing a good pineapple.

USE. Pineapples are frequently used fresh, served alone, or combined with avocado, banana, citrus fruits, mango, and papaya. Pineapple and such vegetables as carrots and cabbage make good salad combinations. Finger-length slices of pineapple are delicious served in iced tea. The juice makes an excellent iced drink or may be combined with other fruit juice for punch. Pineapple may be preserved in the form of jams or pickles, but home canning is not practical in most localities. There is not enough pectin present to make jelly from the juice. Before being added to a gelatin solution, pineapple must be cooked because bromelin, the enzyme present in uncooked pineapple, prevents the gelatin from congealing.

FRESH PINEAPPLE JUICE

YIELD: 2½ to 3½ cups

Cut a peeled ripe pineapple into 8 or more pieces and squeeze through one thickness of poi cloth or sugar sack. Chill the juice and serve.

PINEAPPLE PUNCH

YIELD: 6 servings

⅔ cup sugar
⅔ cup water
4 cups fresh pineapple juice
⅔ cup orange juice
⅓ cup lemon juice
1 teaspoon finely chopped mint leaves

Boil sugar and water 3 minutes and cool. Combine with fruit juice and mint. Pour over cracked ice before serving.

PINEAPPLE PICKLE

YIELD: 5 cups

12 cups pineapple sections (2 medium-sized fruit)
2½ cups white vinegar
4 cups sugar
2 cups water
2 tablespoons whole cloves
2 sticks or ¼ teaspoon ground cinnamon

Peel pineapple and cut crosswise in slices 1 inch thick. Remove core and cut into sections about 1 inch wide. Combine with vinegar, sugar, and water. Tie spices in cheesecloth, add to mixture, and boil slowly 15 minutes. Add pineapple and boil gently in covered container for ½ hour or until tender. Pour into hot sterile jars and seal immediately.

If the pineapple is sour, add ½ cup more sugar to the sirup.

PINEAPPLE-HONEY PRESERVE

YIELD: 2 quarts

10 cups pineapple sections (2 medium fruit)
2 cups orange peel, sliced fine (6 medium-sized oranges)
⅓ to ½ cup finely chopped fresh ginger root
3 cups strained honey
2 cups orange sections

Peel fresh pineapple and cut crosswise into slices about ¾ inch thick. Remove core and cut into sections ¾ inch wide. Remove rind from 6 oranges, cutting so that the membrane can be removed from the orange pulp. Soak rind in water for ½ hour. Drain and cook until tender, changing the water three times during the cooking process. Drain, wash with cold water, and remove white pulp from inside of rind by scraping with a spoon. Cut rind into narrow strips. Remove membrane from orange sections.

Combine pineapple, orange rind, ginger, and honey. Cook over a slow heat until pineapple is partially tender. Add orange sections and continue cooking until pineapple is tender. Drain honey into separate pan and evaporate to a thicker consistency over a very low heat. Pack pineapple mixture in hot sterile jars, fill with hot honey sirup, and seal immediately.

PINEAPPLE JAM

YIELD: 2¼ quarts

12 cups grated or chopped fresh pineapple (2 large fruit)
6 cups sugar
6 tablespoons lemon juice
Rind of 3 lemons, sliced in very narrow strips ½ inch long

Combine pineapple and sugar and allow to stand overnight. Add lemon juice and rind, then cook slowly for 2 hours. Pour into hot sterile jars and seal with paraffin.

PINEAPPLE CONSERVE

YIELD: 6¾ cups

2 cups orange sections
6 cups diced pineapple
¾ cup water
1 cup broken English walnut meats
½ cup finely sliced orange peel
1 cup seedless raisins
6 tablespoons lemon juice
¾ cup sugar for each cup of cooked mixture

Remove rind from the oranges and scrape out the inner white pulp with a spoon or dull knife. Cut rind into very narrow strips. Remove the membrane from the orange sections.

Combine the diced pineapple and water and cook until pineapple begins to soften. Add all the remaining ingredients except the sugar. Measure this fruit mixture and for each cupful add ¾ cup of sugar. Cook over a slow heat until the mixture thickens, stirring frequently. Pour into hot sterile jars and seal at once.

PINEAPPLE CHUTNEY

YIELD: 2 quarts

1 medium-sized pineapple
1 ½ cups vinegar
1 ½ pounds brown sugar
2 cups seedless raisins
1 tablespoon salt
2 tablespoons finely chopped fresh or candied ginger root
1 medium-sized bulb of garlic, chopped fine
2 or 3 finely chopped small fresh or pickled red peppers (Be sure to remove seeds.)
¼ pound finely chopped blanched almonds or macadamia nuts

Peel pineapple, remove core, and cut into small pieces. Add all ingredients except nuts. Cook slowly until pineapple is tender. Add nuts and cook until the mixture thickens to the desired consistency. Stir frequently to prevent scorching. Pour boiling hot chutney into hot sterilized jars and seal at once. Serve with meats or curried dishes.

PINEAPPLE-CARROT SALAD

YIELD: 6 servings

2 cups shredded or grated raw carrot
3 cups shredded fresh pineapple
¾ cup mayonnaise

Mix pineapple and carrot, and chill. Drain off juice. Place the mixture on lettuce leaves and serve with mayonnaise.

PINEAPPLE-CABBAGE SALAD

YIELD: 6 servings

4 cups shredded cabbage
2 cups shredded fresh pineapple
½ cup mayonnaise
⅛ teaspoon salt

Combine cabbage and pineapple and chill. Drain off juice, and add salt. Serve on lettuce leaves and garnish with mayonnaise. Chopped peanuts or chopped green pepper may be added for color.

PINEAPPLE-CRAB SALAD

YIELD: 6 servings

2 ½ cups diced fresh pineapple
1 ½ cups shredded crab meat
⅔ cup mayonnaise
1 ½ tablespoons tomato catsup
1 teaspoon Worcestershire sauce

Mix chilled pineapple and crab meat. Serve on lettuce leaves. Add catsup and Worcestershire sauce to mayonnaise and pour over salad.

POHA

DESCRIPTION. The poha *(Physalis peruviana)** is a small yellow-green or orange fruit resembling a cherry in size and shape. It is enclosed in a thin, cream-colored, paper-like husk. The skin of the fruit is thin and waxy and surrounds a juicy pulp which contains many small seeds. The poha, also called the Cape gooseberry and husk tomato, is related to the ground cherry.

HISTORY. This plant was introduced into the Hawaiian Islands soon after the beginning of travel to the Islands by Europeans. Very likely it was brought here in the early nineteenth century from the Cape of Good Hope. It is a native of Brazil but is now grown in many tropical and subtropical countries. It grows well in Hawaii, especially on the islands of Maui and Hawaii at heights from 1,500 to 4,000 feet.

NUTRITIVE VALUE. In comparison with other Hawaiian fruits, pohas have a low calcium content and high phosphorus and iron contents.

Pohas are a good source of vitamin A and ascorbic acid and a fair source of thiamine. The ascorbic acid content increases as the fruit ripens. Pohas in the green stage contain about 75 percent as much ascorbic acid as in the ripe stage.

SUPPLY. The pohas in Honolulu markets come from both the cultivated and wild plants, but there seems to be little difference in appearance or flavor. They are on the market from February through July; the supply seldom exceeds the demand.

USE. The poha has a pleasing and distinctive flavor. It may be used raw for a dessert or shortcake in much the same ways as the strawberry. Pohas may be used in pie, cooked and served as a sauce on cakes and puddings, but are more favored for use in jam. Because the pectin content is low, pohas are not good for jelly.

POHA-FRUIT CUP

YIELD: 6 servings

1 ½ cups diced pohas
1 ½ cups diced bananas
½ cup diced orange
1 cup diced fresh pineapple
¼ cup lemon juice
½ to ¾ cup sugar
2 teaspoons finely chopped mint

Mix all ingredients and chill. Serve in cocktail glasses. This also makes a good salad combination if the lemon juice, sugar, and mint are omitted. The fruit is then served on lettuce leaves with mayonnaise.

* See fig. 15, p. 77.

POHA-PINEAPPLE COCKTAIL

YIELD: 6 servings

2 cups diced pohas
2⅔ cups diced fresh pineapple
¼ cup lemon juice
¼ cup sugar

Mix ingredients and chill thoroughly. Serve in cocktail glasses.

POHA SAUCE FOR PUDDINGS

YIELD: 6 servings

3 cups diced pohas
1 ⅞ cups sugar
2 tablespoons cornstarch
¼ teaspoon salt
1 ½ cups water or pineapple juice
½ tablespoon vanilla
1 tablespoon butter

Add ½ cup of the sugar to the pohas and allow to stand 15 minutes. Add water or pineapple juice and bring to the boiling point. Mix thoroughly the remaining sugar, salt, and cornstarch and add to the hot liquid, stirring constantly. Boil 5 minutes. Remove from the heat and add butter and vanilla. Serve hot or cold on cake, or on rice or bread puddings.

POHA JAM

YIELD: 1 ½ quarts

6 pounds pohas before husking or 4 quarts after husking
1 cup sugar for each cup of cooked pohas (5 to 6 cups)

Husk, wash, and cook pohas slowly for 30 minutes. Stir frequently until there is sufficient liquid to prevent fruit from scorching. Allow to stand overnight. Measure poha pulp and juice and add an equal quantity of sugar. Cook slowly for 30 minutes to 1 hour, stirring the mixture frequently until the juice thickens slightly when cooled. Pour into hot sterile jars and seal with paraffin.

The quantity of juice resulting from the cooking process varies according to whether pohas are obtained during the dry or the rainy season. When the water content of pohas is unusually high, it is necessary to pour off some of the juice before adding the sugar if more fruit than jelly is desired.

POHA PRESERVES

YIELD: 2 ¼ quarts

6 pounds pohas before husking or 4 quarts after husking
2 lemons, cut into thin half-slices
⅓ cup sugar
1 ⅛ cups sugar to 1 cup cooked poha pulp and juice

Husk and wash pohas. Cook over a low heat. Stir frequently until there is sufficient liquid to keep the fruit from scorching. Cook for 30 minutes, or until fruit is soft. Drain the juice from the fruit. Pour 1 cup of juice over the lemon slices, add ⅓ cup of sugar, and allow to stand overnight. Cook the lemon in this liquid until the rind is transparent. Add lemon and liquid to pohas. Measure and add 1⅛ cups of sugar to each cup of poha mixture. Cook until this mixture thickens slightly but not until the juice gives the jelly test. Pour into hot sterilized jars and seal with paraffin.

ROSELLE

DESCRIPTION. The roselle *(Hibiscus sabdariffa)** is an annual plant that commonly grows to a height of 5 to 8 feet in Hawaii. The fleshy, bright red calyx is the portion of the plant that is used as a fruit.

HISTORY. The plant is reported to have first been introduced into Hawaii from Australia, but in 1904 the Hawaii Agricultural Experiment Station obtained seed from Puerto Rico, made many experimental plantings, and for a number of years fostered its cultivation on a commercial scale. It is reported that at one time more than 200 acres of roselles were under cultivation in Hawaii.

The roselle is commonly propagated by seeds which if they are planted about March and the plants are transplanted to the garden in May, yield fruit in November and December. The roselle can be readily cultivated in home gardens.

NUTRITIVE VALUE. The roselle calyx is very acid to taste and has little or no sugar. Roselles are a poor source of ascorbic acid.

SUPPLY. Roselles are not commonly found in Honolulu markets. The yield in home gardens varies with soil and moisture, but two to three plants should yield (approximately 10 pounds of fruit per plant) sufficient for the average family.

USE. When the fruits are young they can easily be pulled off the plant. As the seed pod ripens and the fruit grows more mature it must be cut from the plant with a knife or pruning shears.

John C. Ripperton, of the Hawaii Agricultural Experiment Station, determined that the calyx of the roselle is the only part of the plant which contains sufficient pectin and acid to produce a satisfactory jelly. From a series of experiments he also concluded that cooking the seed pods with the calyxes does not affect the flavor or consistency of the jelly and that the tedious separation of the calyxes and seed pods is unnecessary.

The roselle makes an excellent jelly of a flavor and color that resemble a mixture of currant and raspberry jelly. When a more concentrated juice is used it is similar to red currant jelly. Roselle juice may also be used in flavoring sherbet or gelatin desserts. Thoroughly cooked, and sweetened, the calyxes may be used as a substitute for cranberry sauce.

ROSELLE JELLY

YIELD: 1 cup jelly for each cup juice

MILD FLAVORED JUICE
Yield: 5½ cups

2 pounds whole fruit (4 quarts firmly packed)

5 pounds water (10 cups)

* See fig. 16, p. 78.

Wash the fruit thoroughly. Add the water; it should half cover the fruit. Place over heat and cook 15 to 20 minutes or until the calyxes are soft. Remove from stove and strain the juice through a flannel jelly bag or two thicknesses of a sugar or flour sack.

For a stronger flavored juice (and jelly) use less than 10 cups of water in its preparation. The stronger flavored juice may be used for fruit drinks, sherbets, and gelatin dessert as well as for jelly. It may be canned for future use. (See canning section, p. 122.)

JELLY

Measure juice prepared according to the recipe above and heat to boiling. Better jelly is obtained if not more than 3 cups of juice are boiled at a time. For each cup of juice, add ¾ cup sugar. Reheat mixture to boiling and boil rapidly until it gives a jelly test by several drops "sheeting" off the spoon. Pour into hot sterilized glasses and seal with paraffin.

If the stronger flavored juice is used for the jelly use 1 cup sugar for each cup of juice.

ROSELLE SAUCE YIELD: 1 pint

6 cups roselle calyxes
1 ½ cups water
1 ¼ cups sugar

Wash the fruit thoroughly, remove the calyxes and measure them. Add water and cook until they are soft. Add sugar and heat until it is dissolved. Serve hot or warm as a sauce with meat.

ROSELLE MARMALADE YIELD: 1 pint

6 cups roselle calyxes
1 ½ cups water
1 ½ to 1 ¾ cups sugar

Prepare as for roselle sauce. Cook mixture slowly until thick, but not until it gives the jelly test.

SOURSOP

DESCRIPTION. The soursop *(Anona muricata)** is a large, heart-shaped fruit. A single fruit may weigh 5 pounds, much larger ones have been reported. The thick skin, or rind, is a deep green and covered with numerous short, pliable spines. The flesh resembles cotton soaked in a highly aromatic liquid. The pulp contains many shiny brown seeds.

HISTORY. The fruit, a native of tropical America, was described as early as 1528 by Gonzalo Hernandez de Oviedo in his Natural History of the

* See fig. 17, p. 79.

Indies. At present, it can be found in most tropical countries, although it is probably more popular in Cuba than in any other place. The name "soursop" by which the fruit is known in most English-speaking countries is of West Indian origin. The history of its introduction into Hawaii is unknown.

NUTRITIVE VALUE. Soursops are a poor source of calcium, and a fair source of iron. Compared with other fruits in this series they are a good source of phosphorus.

Because there appears to be no yellow pigment in soursops, it was thought not worthwhile to test them for vitamin A. The thick juice resulting when the soursop was pressed in two thicknesses of cheesecloth was used for the vitamin tests and was found to be a poor source of thiamine and a fair source of ascorbic acid.

SUPPLY. In Honolulu, the soursop is occasionally found in the markets, but the supply is not equal to the demand. The season ranges from February to September.

USE. The soursop has an acid flavor and a pleasant, refreshing odor. The juice may be extracted by forcing the pulp through a potato ricer or fruit press, or by squeezing it through several thicknesses of cheesecloth. The pulp, freed from the seeds and pulled or cut into small pieces, may be chilled, sweetened, and served as a breakfast fruit, or it may be used in a salad. Iced drinks, sherbets, and gelatin dishes may be made from the extracted juice. The soursop blends well with banana, orange, and pineapple.

SOURSOPADE YIELD: 6 servings

3 1/3 cups soursop juice
2 2/3 cups water
1 cup sugar
2 2/3 tablespoons lemon juice

Mix ingredients and stir them until sugar is dissolved. Pour over cracked ice and serve.

SOURSOP AND PINEAPPLE SHERBET YIELD: 6 to 8 servings

1 cup sugar
1 cup water
1 cup pineapple juice
1 1/2 cups soursop juice
1 egg white

Combine sugar and water and boil 5 minutes. Cool to lukewarm. Add fruit juice and unbeaten egg white. Freeze in an ice-cream freezer, using 8 parts of ice to 1 part of ice-cream salt.

SOURSOP SHERBET YIELD: 1 1/2 quarts

7/8 cup sugar
2 cups water
2 cups soursop juice
1 tablespoon lemon juice
1 egg white

Combine sugar and water and boil 5 minutes. Cool to lukewarm. Add fruit juice and unbeaten egg white. Pour into a freezing container. Freeze with 8 parts of ice and 1 part of ice-cream salt.

SOURSOP MOUSSE I

YIELD: 6 servings

20 marshmallows
¼ cup water
2 tablespoons sugar
1 cup soursop juice
1 cup whipping cream

Add sugar and marshmallows to the water. Place over a low heat until the marshmallows are softened and a smooth mixture is obtained. When the mixture is cool, add soursop juice and allow to stand in a cool place until partially congealed. Add cream which has been whipped. Pour into a mold, seal, and pack in ice, using a mixture of 3 parts of ice to 1 part of ice-cream salt, or freeze in a mechanical refrigerator.

SOURSOP MOUSSE II

YIELD: 6 servings

½ tablespoon gelatin
2 tablespoons cold water
⅓ cup boiling water
1 cup soursop juice
1 cup sugar
1 cup whipping cream

Soak gelatin in the cold water 5 minutes. Pour boiling water over the gelatin and stir until gelatin is dissolved. Combine gelatin mixture and soursop juice. Add sugar and stir until dissolved. Chill and whip cream, then fold into gelatin mixture. Freeze as directed in recipe for Soursop Mousse I.

STRAWBERRY

DESCRIPTION. The cultivated strawberry *(Fragaria chiloensis)* is a juicy red fruit which grows on a low, herbaceous plant. Structurally, it is an enlarged fleshy receptacle from ½ to 1¼ inches in diameter, on the outside of which are imbedded many small seeds. The flavor combines acidity and sweetness in proportions pleasing to most people. Some varieties are more strongly flavored than others.

HISTORY. There are numerous varieties of the strawberry native to widely separated sections of the world. These vary considerably in size, shape, color, and flavor. Many varieties have been developed under cultivation. Several commercial varieties imported from the Mainland are now grown successfully in Hawaii.

A white strawberry indigenous to the Hawaiian Islands was at one time fairly abundant on the islands of Kauai and Hawaii. It still thrives in protected areas such as Kipuka Puaulu (Bird Park), Hawaii National Park.

NUTRITIVE VALUE. In comparison with other fruits, strawberries may be considered a good source of calcium, phosphorus, and iron. The values we found for iron are high and may be in error because of contamination with soil, although great care was used in preparing the sample.

Strawberries are reported to be a fair source of vitamins A and B. Hawaiian-grown strawberries have been found to be an excellent source of ascorbic acid.

SUPPLY. The supply is small, fairly constant, and rarely equal to the demand. The season ranges from December through July.

USE. In Hawaii, strawberries are practically always used fresh because they are too expensive to buy for preserving.

SURINAM CHERRY

(Pitanga)

DESCRIPTION. The Surinam cherry *(Eugenia uniflora)** is a small, bright red fruit about 1 inch in diameter, oblate in form, and conspicuously eight-ribbed. The flesh surrounding the single large seed is soft, juicy, and distinctly acid in flavor.

HISTORY. The Surinam cherry is known as the Pitanga in Brazil where it grows wild along the banks of the streams and edges of the forests. It is also an important cultivated fruit of that region. W. Popenoe reports that it is used more extensively by the inhabitants of Brazil than by the people of any other country. The date of its introduction into Hawaii is unknown.

NUTRITIVE VALUE. The acidity of Surinam cherries is great compared with other fruits in this series; it is exceeded only by tamarinds and the yellow passion fruit. The expressed juice from two different samples showed *p*H values of 2.7 and 3.0. Due to this high acidity, the fruit does not seem very sweet to taste although it has a large quantity of carbohydrate—22 percent—which must be mainly sugars.

Surinam cherries are a fair source of calcium, phosphorus, and iron, having about the same quantities of these minerals as seeded guavas. The cherries are a fair source of vitamin A and ascorbic acid.

SUPPLY. Surinam cherries are not sold in Honolulu markets. The quality and quantity of the fruit obtainable from private gardens varies with the amount of moisture. The season varies with the locality but in many places the shrub bears fruit the year round.

USE. In Hawaii, the Surinam cherry is frequently grown for decorative purposes. One or two raw cherries cut in small pieces and added to each serving of fruit cocktail gives piquancy of color and flavor. The cherries may

* See fig. 18, p. 80.

be cooked and used as sauce or for jam, preserves, or jelly. Because of the tart flavor the jelly or sherbet made from the cherry juice may be served with meat or fowl. Combined with apple and raisins, the cherries may be used for pies and puddings. The juice, prepared as for jelly making, may be used as a foundation for an iced drink. The juice of the firm ripe cherries gives a good test for pectin. The fruit and juice are high in acid but seem to develop a bitter taste on standing. For this reason the fruit should be used as soon as it is picked.

SURINAM CHERRY JAM

YIELD: 1 quart

2 cups water
3¾ cups sugar
3¾ cups seeded Surinam cherries

Combine the sugar and water and bring to the boiling point. Add cherries. Cook slowly for 20 to 25 minutes or until the juice thickens slightly, but not until it gives the jelly test (sheets off the spoon in large drops). Pour into hot sterile jars and seal with paraffin.

SURINAM CHERRY JELLY

YIELD: 5 cups

5 pounds Surinam cherries
7½ cups water or barely enough to cover the fruit
1 cup sugar to each cup of juice

Wash cherries and remove stems and blossom ends. Add water to the fruit, mash, and simmer for 25 minutes, or until the cherries are soft. Strain the juice through a flannel jelly bag or two thicknesses of a sugar or a flour sack.

Measure the juice and place it in a shallow kettle with a capacity at least four times the volume of juice. Heat to the boiling point and boil 5 minutes. Add an equal quantity of sugar; remove the scum as the mixture starts to boil. Boil rapidly until the juice gives the jelly test (sheets off the spoon in large drops), or until the temperature reaches 105° C. or 221° F. on a clear, dry day; or 106° C. or 222° F. on a damp, cloudy day. Pour the jelly into hot sterile glasses and seal with paraffin.

SURINAM CHERRY PUNCH

YIELD: 6 servings (1 cup each)

1⅛ cups Surinam cherry juice
4½ cups water
3 tablespoons lemon juice
1⅓ cups sugar

Prepare Surinam cherry juice as directed in the recipe for jelly. Combine all the ingredients and stir until the sugar is dissolved. Pour over cracked ice before serving.

SURINAM CHERRY SAUCE

YIELD: 1 pint

1 pound or 1 pint Surinam cherries
½ cup water
1¼ to 1½ cups sugar

Wash cherries and remove blossom ends. Add water and simmer 20 minutes over a low heat. Remove from heat and press the cherries through a coarse sieve to remove the seeds. Add sugar to the fruit pulp and reheat to dissolve sugar. Cool. Serve with meat or fowl. This makes a thin sauce. If a sauce stiff enough to mold is desired, the mixture must be cooked a few additional minutes.

SURINAM CHERRY PIE YIELD: 4 to 5 servings

1 ¼ cups seeded Surinam cherries
½ cup seedless raisins
¾ cup diced apple
1 ⅛ cups sugar
3 tablespoons flour
1 teaspoon butter

Line a pie tin with pastry. (See Plain Pastry recipe, p. 16.) Mix the fruit and pour into the pie shell. Sprinkle with flour and sugar and dot with small pieces of butter. Moisten the edge of the pie crust and cover with a second crust. Place in a hot oven (450° F.) for 10 minutes, then reduce the temperature to 350° F. and bake for 30 to 40 minutes, or until the fruit is soft.

TAMARIND

DESCRIPTION. The fruit of the tamarind tree *(Tamarindus indica)** consists of a brittle brown pod, varying from 2 to 6 inches in length and from ½ to 1 inch in width. This encloses a very sticky, acid pulp which surrounds from 1 to 12 shiny brown seeds. In maturity the edible pulp shrinks slightly from the pod.

HISTORY. The tamarind is believed to be a native of tropical Africa and perhaps southern Asia, where it has long been popular. It was early introduced into tropical America and from there was probably brought to Hawaii. One of the first tamarind trees in Hawaii was planted in 1797 by Don Marin at Little Greenwich in Pauoa Valley, Honolulu. It was a favorite tree of the early settlers and is found on many of the old homesteads. An avenue of tamarind trees grew in the palace grounds until King Kalakaua, who did not like the fruit, had the trees removed. In more recent years, the fruit has lost its popularity, partly because of the small beetle which infests most of the pods and partly because of the availability of other fruits.

NUTRITIVE VALUE. Our analyses and those of others indicate that tamarinds, as compared with all other fruits, have an unusually high acid and high sugar content. The acid is reported to be largely tartaric. The acid of the sample analyzed in the Hawaii Agricultural Experiment Station nutrition laboratory was calculated as 14 percent tartaric acid or 12 percent as citric

* See fig. 19, p. 81.

acid. One investigator reports for tamarinds an invert sugar content of 41.2 percent, and our analyses show a carbohydrate by difference of 45.8 percent.

The calcium and phosphorus contents are also unusually high; the value of 0.113 percent for calcium is the highest reported in the literature for any fruit and is equivalent to that reported for some vegetables.

Though some people find the highly acid taste objectionable, many children like tamarinds well enough to strip the trees of the fruits wherever they have the opportunity.

Tamarinds are a good source of thiamine but have little or no vitamin A or ascorbic acid.

SUPPLY. In Hawaii, the fruit ripens during the late summer and fall. No attempt is made to market it commercially.

USE. Tamarinds are much more widely used in other tropical countries than in Hawaii, although many Island children eat the edible portion as do the East Indians and Arabs, who prize tamarinds as highly as dried dates and figs. Tamarinds may be preserved indefinitely by pressing the shelled fruit into cakes and keeping these in a cool place, or by packing in jars alternate layers of whole tamarinds and sugar. The shelled fruit may be cooked in a sirup until the fruit is quite soft and then put through a coarse sieve. As much pulp as possible is pressed through. This sirup may be canned and used diluted in a pleasing and refreshing iced drink. Because of their high acidity, tamarinds may be substituted for lemons or limes. W. Popenoe states that in the Orient tamarinds are widely used in chutneys and curries and for pickling fish.

FRESH TAMARINDADE

YIELD: 6 servings

21 shelled tamarinds
6 cups water
¾ cup sugar

Add tamarinds to water and allow to stand 10 minutes. Stir well, add sugar, and chill. Serve with cracked ice.

TAMARIND SIRUP

YIELD: 2 quarts

2 cups shelled tamarinds pressed down in cup
6 cups water
5⅓ cups sugar

Pour water over tamarinds and allow to stand overnight. Add sugar and boil 15 minutes. Strain through a coarse sieve, rubbing through as much pulp as possible. Heat sirup to the boiling point. Pour into hot sterile jars and seal.

TAMARINDADE

YIELD: 6 servings

1 cup tamarind sirup
4¾ cups water
6 sprigs of mint

Mix sirup and water. Chill and serve with cracked ice. Place a sprig of mint in each glass.

WATERMELON

DESCRIPTION. The watermelon *(Citrullus vulgaris)*, a large, smooth green melon, is cultivated in many sections of the world. The rind varies from 3/8 to 1½ inches in thickness and, from the outside in, shades from green to white to pink. The crisp, juicy, pink flesh contains many black or white flat slippery seeds. In good melons, the flavor is delicate, sweet, and refreshing. The watermelons grown in Hawaii average from 10 to 20 pounds. Few really large melons are seen on the market.

HISTORY. The watermelon is a native of Africa but has spread throughout the world. David Livingston in 1857 wrote that in Africa when watermelons were plentiful they were a favorite food of the wild animals as well as the natives. Although in Hawaii a large supply of melons has been grown only during the last few years, some have been grown here continuously since the first seeds were left by Captain Cook in 1779.

NUTRITIVE VALUE. Watermelons, like strawberries and mountain apples, contain 90 percent or more of water and 7 to 8 percent of carbohydrate in the form of sugar.

Watermelons are low in calcium, phosphorus, and iron.

Vitamin determinations made elsewhere show watermelons to be a poor source of vitamin A, thiamine, and ascorbic acid. Tests made in Hawaii also show them to be a poor source of ascorbic acid.

SUPPLY. Watermelons are on the market from May to August but the supply rarely meets the demand.

USE. The delicious watermelon grown in Hawaii provides a favorite and refreshing dessert. It may be used for fruit cocktail with the addition of lemon or grape juice, or in combination with other fruits. Fruit salad is made very attractive by the addition of watermelon cubes or balls. The rind may be prepared as a preserve or pickle.

WATERMELON COCKTAIL

YIELD: 6 servings

1 tablespoon sugar
1/16 teaspoon salt
4½ tablespoons lemon juice
4 cups ripe watermelon cubes

Add salt and sugar to the lemon juice and pour the mixture over watermelon cubes. Allow the cubes to stand 1 hour or more in a refrigerator before serving them in cocktail glasses. A sprig of fresh mint may be used as a garnish for each serving.

WATERMELON AND GRAPE JUICE COCKTAIL

YIELD: 6 servings

1/16 teaspoon salt
4½ tablespoons lemon juice
5 tablespoons grape juice
4 cups ripe watermelon cubes

Mix salt, lemon juice, and grape juice and pour the mixture over watermelon cubes. Allow the cubes to stand in the juice for 1 hour or more in a refrigerator. Serve in cocktail glasses.

WATERMELON PICKLE

YIELD: 1½ quarts

3 pounds or 2½ quarts watermelon rind (rind of 1 melon)
6 to 7 cups salt water (1 tablespoon salt to 1 cup water)
4 to 5 cups weak vinegar solution (1 cup vinegar to 2 cups water)
1½ cups vinegar
1½ cups sugar
2½ cups water
1 tablespoon whole allspice
2 tablespoons stick cinnamon
¼ teaspoon salt
1 tablespoon whole cloves

Pare watermelon rind, removing all outside green rind and practically all the pink meat. Cut into pieces about 3 inches long and ¾ inch wide. Soak 24 hours in salt water sufficient to cover rind. Drain and soak 24 hours in weak vinegar solution sufficient to cover rind. Drain and cook in clear water 1½ hours, or until tender; then drain off water. Make a sirup by heating vinegar, sugar, water, and salt. Tie spices loosely in a piece of cheesecloth and add to the mixture. Cover and allow to stand 1 hour to absorb spice flavor.

Add rind and boil gently for 1½ hours in a covered kettle. Pour into hot sterile jars and seal at once. Exposure to air darkens the pickle.

Appendix I---Preserving Fruit

A. HOW TO CAN FRUIT

Fruits of Hawaii are canned (1) to preserve them for future use; (2) to make seasonable fruits available all year; and (3) to prevent unnecessary spoilage.

Fruits grown in Hawaii may be preserved by canning, making them into jellies, jams, and marmalades, or pickles, or by canning or bottling the juice. Blackberry, fig, guava, mango, pineapple, papaya, poha, and roselle make excellent preserves, or jams. Guava, blackberry, Isabella grape, mulberry, and passion fruit make good juices. The juice may be made into jellies at once or canned for use as a beverage or for making jellies later. Figs, guavas, litchis, and mangoes may be canned successfully.

Precautions to Insure Success

In order to preserve foods successfully, all bacteria, yeast, molds, and enzymes present must be killed, and the development of more during storage must be prevented. Heating to the temperature of boiling water (212° F.), or slightly below, will destroy enzymes, yeasts, and molds, but bacteria are more difficult to kill. It is not only the amount of heat but also the length of time it is applied that is important in the destruction of bacteria. For this reason it is important that fruits be boiled or processed exactly the length of time stated in the recipe.

There are other factors involved in successful canning. Adherence to the following directions is important:

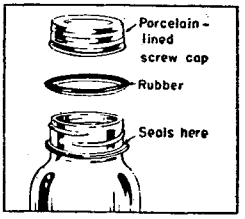
1. (*a*) For canning whole or in slices, use fresh, firm, good quality fruit.
   (*b*) For puree or juice, use soft ripe fruit. Care should be taken to remove all bruised or decayed spots.
2. Can products as soon as possible after they have been picked. The vitamin content is higher then, and the fruit is less likely to spoil.
3. Thoroughly wash all products, jars, and covers.
4. Properly sterilize all bottles, jars, covers, and utensils used in filling the jars.
5. Use matching jars and lids and effective sealing for all glasses or bottles.
6. Store all canned products in a cool, dry, dark place.

Containers

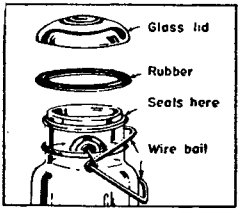
SELECTION. Jars suitable for canning must form an airtight seal if the product is to keep indefinitely. Many jars in which foods have been purchased at stores may be used for canning if new metal inner caps are obtained. It is best to use these containers for pickles or other products which do not require processing.

APPENDIX I

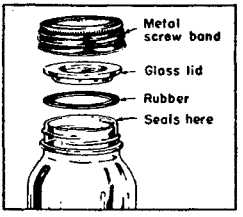
Do not attempt to re-use old lids having rubber sealing compound. With Mason type jars and covers, use new rubber rings whenever possible. However, old rings in good condition may be used for fruit or tomatoes.



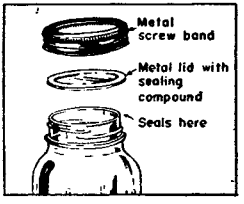
Zinc porcelain-lined cap with shoulder rubber ring, to fit standard Mason jar.



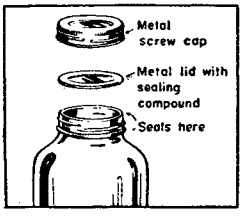
Lightning-type jar is sealed with glass lid and rubber ring, held in place by wire bail.



Glass lid and top-seal rubber ring, held in place by metal screw band, to fit standard Mason jar.



Flat metal lid edged with sealing compound, held in place by metal screw band, to fit standard Mason jar.



Coffee or other commercial jars—"63's"—with flat metal lid edged with sealing compound, bought new, held in place by metal screw cap that came with jar.

FIGURE 21.—Types of jars used for canning. (Drawings from U. S. Dept. of Agr. Bul. AWI-93.)

Jelly glasses, mayonnaise or pickle jars, or any other glass containers of suitable size may be used for jellies and jams if they are sealed with a layer of hot melted paraffin and then covered with waxed paper or other suitable protection from dust and insects.

Bottles such as those in which beer or soda pop is sold may be used for fruit juices, fruit pulp, and catsup if they are sealed airtight. An airtight seal can be obtained with crown type caps or with corks which are coated well with paraffin after being securely fitted into the mouth of the bottle. Dark glass bottles preserve the color of a product better than the clear glass ones do.

Inspect carefully all glass jars and covers to be used. Discard any with cracks, chips, dents, or any other defects that would prevent airtight sealing.

PREPARATION. Wash containers with warm soapy water. A bottle brush is convenient to use and it does a thorough job. Place a towel or rack in the bottom of a kettle to keep the containers from breaking, and add cold water to a depth of 1 to 2 inches. Rinse the containers and place them upside down in the kettle. Place the kettle on the stove, bring the water to a boil, and continue boiling it 20 minutes. Keep the containers hot until ready to fill them with boiling fruit or juice. Then remove containers from the kettle, drain but do not wipe dry, and fill immediately.

Wash rubbers with soap and water, then rinse. Plunge bottle caps or self-seal lids into boiling water for 1 minute—if left longer the seal will be destroyed. Jar covers, rubbers, or corks should be put into boiling water for 2 or 3 minutes just before being used.

METHODS OF COOKING FRUIT

It is desirable to precook practically all fruit before canning. Drawing out the juices shrinks the fruit and makes it possible to pack the jars more firmly and to shorten the time necessary for sterilizing the fruit in the jar. Fruits may be cooked in their own juice, in water, or in sirup. Directions for making canning-sirups are given in the table at the top of page 122.

OPEN KETTLE. This method may be used for fruit packed in a sugar sirup or for fruit and fruit juices which are high in acid content. Although this is the simplest method of canning, it is not always the best since the fruit may come in contact with bacteria when the jars are being filled and sealed.

All fruit canned by the open kettle method should be thoroughly cooked and be boiling hot at the time it is poured into hot sterilized bottles or jars. The containers should be sealed immediately after they are filled. If a number of jars are to be filled at one time the fruit remaining in the kettle should be reheated to boiling several times during the process.

HOT PACK. When fruit is to be canned by this method, blanch* or precook it as directed in the specific recipe being used. Then pack hot fruit quickly into hot sterilized jars. Pack well, but do not force in so much fruit that there is no room for liquid—it is difficult for heat to penetrate to the center of a too solidly packed jar, and such penetration is necessary to insure complete sterilization. Add boiling juice or sirup to within ¼ or ½ inch of the top of the jar. Insert sterilized knife blade or spoon handle into filled jars to allow air bubbles to escape.

Put sterilized rubbers and covers on at once. Screw covers on tightly, then loosen slightly—about one quarter turn. If wire clamp type of jar is used, completely seal the jar and then loosen the side clamp.

The fruit is then ready to be processed† in either the boiling water bath or the pressure cooker.

The boiling water bath may be successfully used for fruits canned in water or sugar sirup, for sweetened or unsweetened fruit juice, fruit sauce, and thin fruit pulp. A large tightly covered container deep enough to allow covering tops of jars with at least 1 or 2 inches of water is needed. There should be a wooden or wire rack that will fit into the canner to hold the jars upright and keep them from touching the bottom of the canner. A canner may easily be made by fitting a rack in a wash boiler, deep well cooker of an electric stove,

* To blanch fruit is to cover it with boiling water for 1 to 2 minutes for the purpose of facilitating the removal of skins.

† To process fruit is to heat or cook in jars or cans for the length of time necessary to insure sterilization.

deep kettle from a fireless cooker or other large kettle with tight fitting lid, or a kerosene can with wooden lid. If possible, a handle or a bail should be fastened to the rack to make lifting jars in and out of the hot water easier.

When the canner has been prepared, fill it with hot water to a depth slightly less than the height of the jars to be put in it. To avoid breakage place the filled jars in the container while they are still hot. Add enough hot water to cover the tops of the jars to a depth of 1 or 2 inches. Cover the canner, bring the water bath to boiling, and keep it at the boiling point during the entire time of processing. The time required for processing varies with each product and with the size of the jar. (See chart, p. 122.) Processing time is counted only from the time the water begins to boil after the jars have been placed in it. Hot water should be added as needed to keep the level of water in the canner 1 or 2 inches above the tops of the jars.

When the fruit has been processed the required time, dip out sufficient water from the canner to be able to grasp the covers of the jars. Remove one jar at a time and tighten cap, or completely seal the clamp type of jar, at once. (If lifting tongs are available it is not necessary to dip out any water before removing the jars.)

The pressure cooker need not be used for acid fruits or other fruits canned in a sugar sirup, but it must be used for non-acid foods, such as meat, fish, and non-acid vegetables. Because steam is enclosed in the cooker, a temperature above boiling is obtained and the temperature inside the jar becomes higher than that reached when the boiling water bath is used.

Prepare the jars of fruit as for the boiling water bath method, place the filled jars in the pressure cooker, and attach the cover of the cooker. Steam should be allowed to escape from the vent for 7 minutes before closing the pet cock on pressure cookers of the size commonly used in home canning. This procedure drives out all the air in the cooker and makes sure that the temperature within corresponds to that shown on the dial. For further directions regarding the use of a pressure cooker for processing fruit, follow the instructions issued by the manufacturer of the cooker you are using.

Care After Canning

Never open a jar to replace liquid which has been lost in processing. Place jars right side up to cool. Do not set them on a cold surface or in a draft while they are still hot.

When jars have cooled overnight, test for leaks around the lids by carefully tilting each jar. If a leak is found, or if rubber ring bulges out from a lid, open the jar, pour the contents into a kettle and heat to boiling. Then pack fruit in hot sterilized jar with new rubber ring, and process again. If the self-seal type of cover is being used, always use a new inner lid when resealing.

When all jars have been tested and are ready to store, wipe them clean with a damp cloth. Label each jar with the contents and the date of canning. Store in a cool, dark, dry place. Inspect the jars frequently thereafter for the first few days for signs of leakage. If any leaks appear, empty fruit into kettle and repeat the whole canning process.

APPENDIX I

B. CHART FOR MAKING SIRUPS USED IN CANNING

Sirup	Sugar	Water or juice
	cups	*cups*
Thin	⅓	1
Moderately thin	½	1
Medium (for sour fruit)	1	1
Thick (for fruit to be preserved)	1⅓ to 2	1

Method: Combine ingredients and heat. Stir until sugar is dissolved and sirup begins to boil.

C. PREPARATION AND TIME CHART FOR CANNING FRUIT[1]

Fruit	Preparation	Processing time in hot water bath or pressure cooker for pints or quarts	Cooking time in open kettle
Figs	Select firm ripe figs. Wash and remove blemishes. Peel if desired. To do so blanch[2] 1 or 2 minutes in boiling water, plunge into cold water, then peel. Prepare sufficient moderately thin or medium sirup to half cover fruit. Allow 6 to 8 figs for each pint jar to be canned.		
	Water Bath: Simmer figs in sirup for 10 minutes. Pack figs in hot sterilized jars and cover with sirup to within ½ inch of top of jar. Partially seal and process.[3]	25 to 30 minutes	
	Pressure Cooker: Prepare figs as directed in water bath method. Partially seal and process.	5 minutes at 10 pounds pressure	
Preserved figs	*Open Kettle:* Peel figs as directed above. Prepare a thick sirup using 1⅓ or 1½ cups sugar to 1 cup water. Add figs, cover, and simmer gently for 1½ to 2 hours. Turn figs several times while they are cooking. When tender bring to a brisk boil, then pack in hot sterilized jars. Cover with boiling sirup and seal at once. One-fourth cup thinly sliced pieces of lemon for each pint jar may be added when sirup is prepared.		1½ to 2 hours
Fruit juices: Blackberry, Isabella grape, Java plum, Roselle, Surinam cherry, Mulberry	Select ripe fruit for juice to be used as a beverage and half-ripe fruit for juice intended for jelly. Wash fruit and remove blemishes. Place in a kettle and add sufficient water to partially cover the fruit. Mash fruit with a wooden potato masher, then simmer until it is soft. Pour into thick cloth bag and allow juice to drain. Add sugar to juice according to taste.		

[1] For more detailed information about methods of canning, see circulars and bulletins prepared by the Bureau of Human Nutrition and Home Economics, United States Department of Agriculture. These may be obtained free or for a nominal sum from the Superintendent of Documents, United States Government Printing Office, Washington, D. C.

[2] To blanch fruit is to cover it with boiling water for 1 to 2 minutes for the purpose of facilitating the removal of skins.

[3] To process fruit is to heat or cook in jars or cans for the length of time necessary to insure sterilization.

C. Preparation and Time Chart for Canning Fruit—*Continued*

Fruit	Preparation	Processing time in hot water bath or pressure cooker for pints or quarts	Cooking time in open kettle
	Open Kettle: Heat juice to boiling and boil for only 3 minutes. Pour into hot sterilized bottles and seal at once.		3 minutes
	Water Bath: Heat juice to the boiling point, pour into hot sterilized jars or bottles, partially seal and process.	5 to 10 minutes	
Guava juice	*Open Kettle:* Prepare as directed in recipe, p. 42. Add ⅓ cup sugar to each cup of juice if desired. Bring to boiling point, stirring until sugar is dissolved. Boil vigorously for 3 minutes. Pour into hot sterilized bottles or jars and seal at once.		3 minutes
Guava pulp	Prepare ripe guavas as directed in the recipe for guava juice. After juice has been strained through a jelly bag, press the remaining pulp through a sieve or fruit press to remove seeds. Recombine pulp and juice. Sweeten to taste if desired. Pulp remaining after extracting juice for jelly may be used if additional guava juice is added to thin pulp to the consistency of a fruit sauce.		
	Open Kettle: Boil pulp vigorously for 10 minutes or to 212° F. Test with a thermometer if possible. Pour into hot sterilized jars. Insert sterilized knife and allow air bubbles to escape. Seal at once.		10 minutes
	Water Bath: Heat pulp to boiling, pour into hot sterilized jars, partially seal, and process.	25 minutes	
Guava slices	*Open Kettle:* Prepare as directed in recipe for stewed guavas on page 43. Heat until boiling vigorously. Pour immediately into hot sterilized jars. Seal at once.		3 minutes
Litchis	*Water Bath:* Wash and peel litchis. Loosen fruit from the seed at the stem and cut lengthwise. Remove the seed leaving the fruit in one piece. Add 1 cup sugar to 3 cups litchis. Heat to boiling and boil gently for 2 minutes. Fill hot sterile jars with boiling hot fruit, cover with boiling juice, and partially seal. For additional flavor, add 1 teaspoon lemon or lime juice to each pint before sealing jar. Process in water bath.	15 minutes	

C. Preparation and Time Chart for Canning Fruit—*Continued*

Fruit	Preparation	Processing time in hot water bath or pressure cooker for pints or quarts	Cooking time in open kettle
	Pressure Cooker: Prepare fruit as directed for water bath method. Prepare a moderately thin sirup (see chart p. 122), add fruit, and boil 2 minutes. Pack fruit in hot sterile jars, and cover with sirup to within ½ inch of top of the jar. Partially seal and process. Remove jars from cooker, and seal completely. If desired, add 1 teaspoon lemon or lime juice to each jar before processing.	5 minutes at 10 pounds pressure	
Mango sauce	Prepare green, half-ripe, or ripe mangoes as directed in the recipe, p. 63. Press pulp through a sieve if mangoes are stringy. Sweeten if desired. Sauce should be fairly thin; add boiling water if necessary. *Open Kettle:* Heat sauce to boiling, boil vigorously 5 to 8 minutes. Pour into hot sterilized jars. Insert sterilized knife to allow air bubbles to escape. Seal at once.		5 to 8 minutes
	Water Bath: Pour boiling hot sauce, prepared as for open kettle canning, into hot sterilized jars to within ½ inch of the top. Insert sterilized knife and allow air bubbles to escape. Partially seal and process in water bath. Remove and seal completely.	10 minutes	
Mango slices	Select firm ripe or half-ripe mangoes that are not fibrous. Peel and slice in large slices. Use remaining pulp for sauce. Prepare sufficient medium or heavy sirup to half cover fruit. *Open Kettle:* Add mango slices to hot sirup and cook 10 to 15 minutes or until edges become transparent. One tablespoon lemon juice may be added for each pint if desired. Pack slices in hot sterilized jars, cover with boiling sirup, and seal at once.		10 to 15 minutes
	Water Bath: Add mango slices to hot sirup. Cook ripe fruit 5 minutes—half-ripe fruit 10 minutes. Pack in hot sterilized jars and cover with boiling sirup to within ½ inch of the top. Partially seal and process.	15 to 20 minutes	
	Pressure Cooker: Pack partially cooked mango slices, prepared as directed in water bath method, in hot sterilized jars. Partially seal and process. Remove from cooker and seal completely.	5 minutes at 10 pounds pressure	
	Uncooked slices may be packed in hot sterile jars and covered with boiling sirup to within ½ inch of the top. Partially seal and process.	10 minutes at 10 pounds pressure	

APPENDIX I

D. HOW TO MAKE JELLY

Selection of Fruit

Firm ripe or under-ripe fruit should be used for jelly. Pectin and acid content decrease as the fruit ripens. Over-ripe fruit should be used for butter, jam, or marmalade but not for jelly.

Extraction of Juice

Wash, remove blossom and stem ends, and cut fruit into slices or quarters—small fruits, such as berries, cherries, or grapes should be cooked whole. Place fruit in a kettle and add enough water to partially cover so that water can be seen around the edge of kettle. To berries and grapes, add only sufficient water to prevent scorching. Cook slowly until fruit is soft, stirring frequently. Pour cooked fruit into a jelly bag made of flannel or two thicknesses of a flour or sugar sack. Allow to drain; do not squeeze the bag if a clear jelly is desired.

Press the remaining fruit pulp through a sieve to remove seeds and skins. Use this pulp in making fruit butter, jam, or catsup.

Pectin Test

Some fruits contain more pectin than others. Juice which contains little or no pectin will not jell. It is necessary to combine it with fruit high in pectin, such as guava, or with commercial liquid pectin. It is desirable to test juice for pectin in order to judge the amount of sugar to be used. Juice containing a large amount of pectin needs more sugar than juice low in pectin.

The *alcohol test* for pectin is made by combining in a glass 1 tablespoon of juice with 1 tablespoon of grain alcohol. Shake the mixture gently but do not stir. Examine in a few seconds, and if the mixture slips from the glass in one large mass, there is considerable pectin present. In that case 1 cup of sugar should be used to each cup of juice. Because guavas usually contain more pectin than other fruit, 1 to 1¼ cups sugar may be used with the juice of sour guavas.

Sterilizing Glasses

Wash glasses and covers thoroughly with warm soapy water. Place a towel in the bottom of a kettle or dishpan and partially fill with cold water. Rinse glasses and place upside down in the water. Bring the water to boiling and boil for 10 to 15 minutes. When ready to use, drain but do not wipe hot glasses. Sterilize covers by placing in boiling water 2 to 3 minutes.

Cooking Jelly

Jelly should not be made in quantities larger than 3 cups at one time. A strong flavored, dark, gummy jelly results from long cooking in large quantities. Use a shallow kettle which will hold four times the amount of juice to be cooked. Rapid evaporation and a short cooking period are desirable for good jelly.

Bring the juice to the boiling point, and if more than 2 cups are used, boil vigorously from 5 to 10 minutes. Add sugar and stir until it is dissolved. Remove scum which forms on top. Boil rapidly until a jelly test is obtained several times.

Jelly Tests

After boiling juice for 5 to 8 minutes test it by one of the following methods:

SHEET TEST. Allow juice to cool slightly in a large metal spoon, then return it to the kettle a drop at a time. When three or four large drops run together and "sheet" off in one large drop the juice has reached the jell stage. In order to avoid over-cooking, it is well to remove the kettle from the fire during testing.

THERMOMETER TEST. Place a thermometer in boiling fruit juice, making sure it does not touch the bottom of the pan. For most jellies cooked at sea level, heat the juice to one of the following temperatures: 105° C. or 221° F. on a clear day, and 106° C. or 222° F. on a damp rainy day.

Causes of Unsatisfactory Jelly

Inexperienced jelly-makers sometimes obtain an unsatisfactory product without knowing why. Characteristics of poor jellies and the causes for them follow:

CHARACTERISTICS	CAUSES
Sirupy	Too much sugar, under-cooking
Tough	Too little sugar, over-cooking
Dark	Too slow cooking, cooking in too large quantities
Cloudy	Improper straining of juice
Fermented	Improper sterilization, delayed or improper sealing of glasses

Sealing and Storing

As soon as the jelly test is obtained, remove the jelly from the heat and remove the scum. Pour hot jelly into hot sterilized glasses, filling them to within ½ inch of the top. Cover immediately with metal covers or a thin layer of paraffin. When jelly is cold, seal by pouring melted paraffin to a thickness of about ¼ inch over the jelly; tip glass to insure a perfect seal around the edges. When paraffin is firmly set, wipe glasses with a damp cloth and cover with lids or pieces of heavy wrapping paper. Label and store in a cool, dry, dark place.

Appendix II---Hawaiian Fruits as Sources of Vitamins

Sources			
Excellent	Good	Fair	Poor
VITAMIN A			
Mango (with deep orange flesh)	Papaya Poha	Banana Carambola Guava, common Passion fruit Surinam cherry	Avocado Breadfruit Fig Mountain apple Orange juice Pineapple
THIAMINE			
	Tamarind	Avocado Breadfruit Coconut Mango, Pirie Orange juice Pineapple Poha	Banana Carambola Fig Guava Mountain apple Papaya Soursop
ASCORBIC ACID			
Guava, common Ketambilla Mango, common Orange juice Papaya Strawberry	Carambola Carissa Guava, Cattley Litchi Mango (some varieties) Poha	Breadfruit, cooked Java plum Lime Mango, Pirie Mountain apple Mulberry Passion fruit Pineapple Roselle Soursop Surinam cherry	Avocado Banana Coconut water Fig Grape Watermelon

Appendix III---Vitamin Content of Hawaiian Fruits

Fruit	Approximate amounts of edible portions that weigh 100 grams	Vitamins[1] per 100 grams of edible portion		
		Vitamin A	Thiamine	Ascorbic acid
		I. U.	*micrograms*	*milligrams*
Avocado	¼ medium, ⅔ cup sliced	150 to 400	80 to 150	5 to 15
Banana, baking	1 medium	1,200	40	15
Banana, Bluefield	1 medium	500	(2)	1 to 7
Breadfruit	½ cup, scant	120	115	40 raw; 20 cooked
Carambola	2 large	1,500	35	35
Carissa	5 medium	(2)	.....	54
Coconut (fresh, mature, white meat)	¾ cup grated	0	110	0
Coconut water	½ cup, scant	0	(2)	1 to 3
Fig	2 medium	80	30	2
Grape, Isabella	⅔ cup, seeded	.....	.....	4
Guava, Cattley (red or light yellow)	10 to 12	.....	.....	25 to 50
Guava, common (seeds removed)	1½ medium	600	40	95 to 300
Guava juice and pulp	½ cup	.....	.....	30 to 130
Java plum (jambolan)	25 medium, ¾ cup seeded	.....	.....	30
Ketambilla	16 medium, ⅔ cup sliced	.....	.....	90
Lime juice (4 varieties)	½ cup	.....	.....	10 to 30
Litchi	21	0	.....	60
Mango, different varieties (green or half-ripe)	⅔ of medium	.....	.....	30 to 150
Mango, different varieties (ripe)	⅔ of medium	.....	.....	15 to 115
Mango, Pirie	⅔ cup sliced	5,500	60	15
Mountain apple	2 medium	10	15	17
Mulberry	1 cup, scant	.....	.....	13
Orange juice, Kona	½ cup, scant	50	50	65
Papaya, Solo	⅓ to ½	2,500	30	84
Passion fruit juice	½ cup, scant	570	.....	18
Pineapple	⅔ cup ½-inch cubes	110	75	7 to 14
Poha	1 cup	4,000	150	35
Roselle	2 cups	.....	.....	10
Soursop	½ cup, scant	0	45	20
Strawberry	¾ cup	.....	.....	64
Surinam cherry	28 large, ¾ cup stoned	1,200	.....	20
Tamarind	⅓ cup pulp	0	300	(2)
Watermelon	⅔ cup ½-inch cubes	.....	.....	6

[1] Blank spaces in table indicate that no tests have been made.

[2] Too little to determine.

Appendix IV---Criteria for Rating Fruits as Sources of Minerals and Vitamins

The following criteria have been used as bases for statements regarding the mineral and vitamin values of fruits discussed in Bulletin 00:

MINERALS. Since fruits, on the whole, are poor sources of calcium, phosphorus, and iron, they should not be depended upon to contribute significant quantities of these minerals. (There are more base forming elements than acid forming elements in fruits so that practically all fruits yield an alkaline ash and make the urine more alkaline.) It is recommended that the daily diet of the average adult should supply 0.8 gram of calcium, 1.32 grams of phosphorus, and 12 milligrams (0.012 gm.) of iron.

For purposes of comparison in this bulletin, the *arbitrary scale* given below has been used for rating fruits as good, fair, and poor sources of calcium, phosphorus, and iron.

MINERALS	RATING		
	Good	Fair	Poor
	Gm. per 100 gm. edible fruit	*Gm. per 100 gm. edible fruit*	*Gm. per 100 gm. edible fruit*
Calcium	More than 0.020	0.010 to 0.020	Less than 0.010
Phosphorus	More than 0.030	0.020 to 0.030	Less than 0.020
Iron	More than 0.0005	0.0003 to 0.0005	Less than 0.0003

VITAMINS. Fruits constitute the best sources of ascorbic acid in the diet but they vary greatly in their content of this vitamin. Fruits are usually poor sources of thiamine; they furnish but little of the day's quota of this important vitamin. Only those fruits having a deep yellow or orange color are good sources of vitamin A.

The National Research Council recommends that the daily diet of the average adult should supply 5,000 International Units of vitamin A, 1,800 micrograms of thiamine, and 75 milligrams of ascorbic acid.

For purposes of comparison in this bulletin, the *arbitrary scale* given below has been used for rating fruits as excellent, good, fair, and poor sources of these three vitamins.

VITAMINS	RATING			
	Excellent	Good	Fair	Poor
	Per 100 gm. edible fruit	*Per 100 gm. edible fruit*	*Per 100 gm. edible fruit*	*Per 100 gm. edible fruit*
Vitamin A, International Units	More than 5,000	2,500 to 5,000	500 to 2,500	Less than 500
Thiamine (vitamin B_1), micrograms	More than 400	200 to 400	50 to 200	Less than 50
Ascorbic acid (vitamin C), milligrams	More than 60	30 to 60	10 to 30	Less than 10